A CHILTON PUBLICATION

the Iron Age

NATIONAL METALWORKING WEEKLY

April 29, 1954

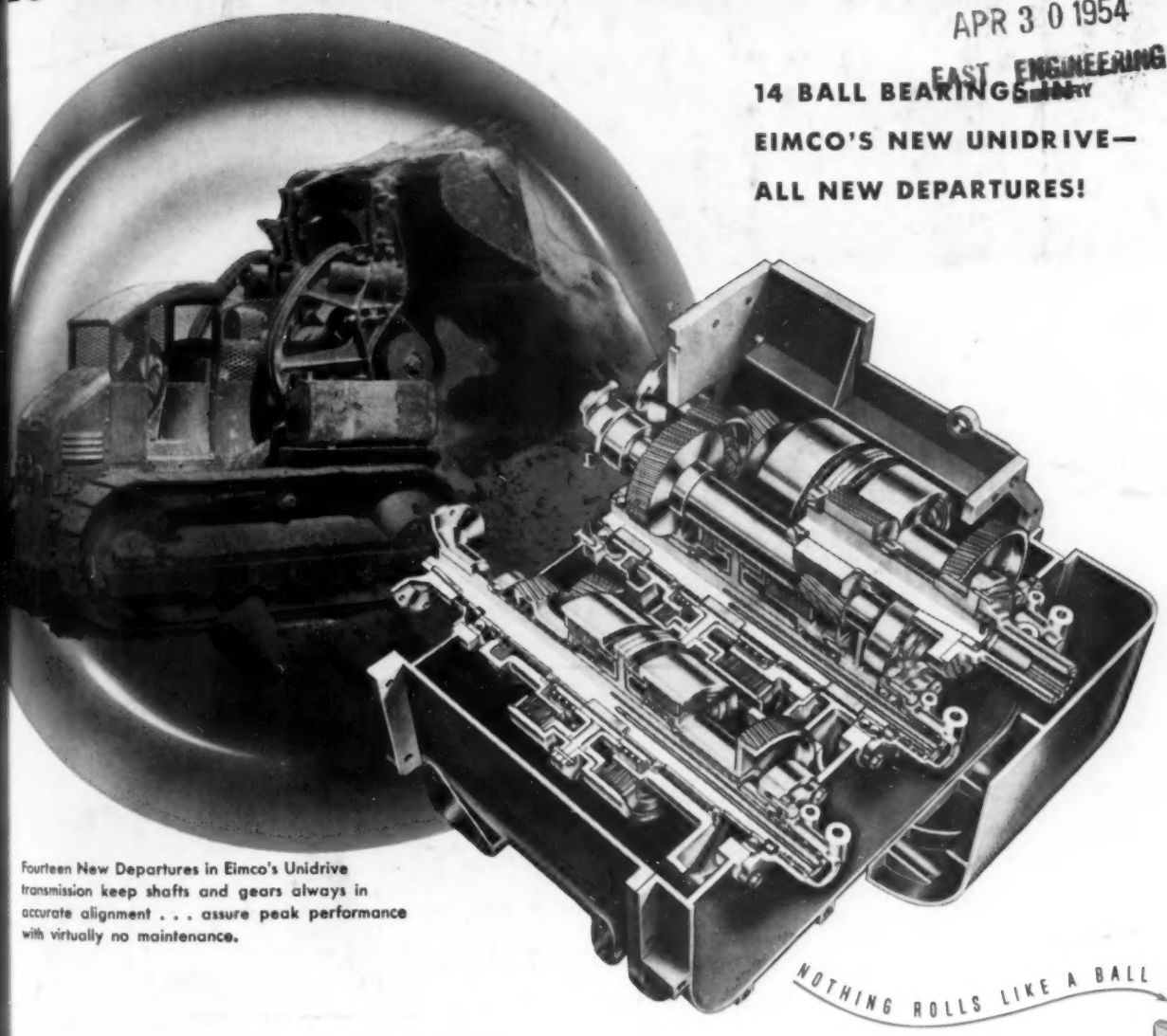
NTS PAGE 2

ts Transmission Tells the Story!

14 BALL BEARINGS

EIMCO'S NEW UNIDRIVE—

ALL NEW DEPARTURES!



Fourteen New Departures in Eimco's Unidrive transmission keep shafts and gears always in accurate alignment . . . assure peak performance with virtually no maintenance.

NOTHING ROLLS LIKE A BALL

Rough terrain and tight spots are no problems to Eimco's agile 105 Tractor-Loader with its new Unidrive transmission. And contributing to the Unidrive's advantages are 14 New Departure precision **ball** bearings. These New Departures mean positive, accurate positioning of the closely related moving parts. They carry radial, thrust and combination loads. They permit compact, rugged design . . . assure long life with no need for adjustment.

Whatever the bearing problem, New Departure can help you. When improving a product or designing a new one . . . *talk to your New Departure engineer.*

NEW DEPARTURE

BALL BEARINGS

NEW DEPARTURE • DIVISION OF GENERAL MOTORS • BRISTOL, CONNECTICUT

Plants also in Meriden, Connecticut, and Sandusky, Ohio

In Canada: McKinnon Industries, Ltd., St. Catharines, Ontario

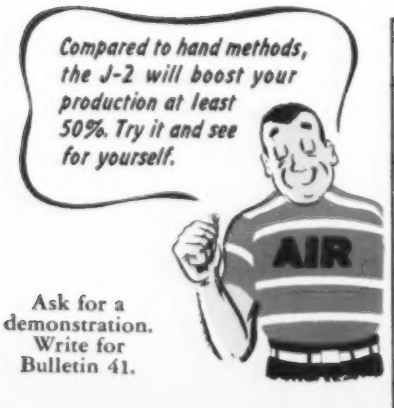
Speed up the job with the –

NEW ROTOR IMPACT WRENCH

FAST. Powerful air tool. 2100 solid blows per minute set nuts in a hurry. Reversible for removing nuts.

NON-FATIGUING. Weighs only 3 lbs. Well balanced. No stalling shock. No twist.

LOW MAINTENANCE. Fewer parts . . . some interchangeable . . . some reversible. Steel clutch housing. Rugged throughout.



Ask for a demonstration. Write for Bulletin 41.

SPECIFICATIONS

MODELS	Blows per Minute	Length	Weight	Square Drive*	Side to Center	Hose Connection	Rated Capacity. (Bolt Size)
J-2-S Side Handle	2100	6"	3#	½"	1⅛"	¼"	¼"
J-2-L Lever Handle	2100	7¾"	3¼#	½"	1⅛"	¼"	¼"

*⅜" square drive or 7/16" Quick-Change Chuck is optional.

THE ROTOR TOOL CO.

CLEVELAND, OHIO

UNBIASED ANALYSIS OF PORTABLE TOOL PROBLEMS

Tool Steel Topics

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

In the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributor:* Bethlehem Steel Export Corporation

BETHLEHEM TOOL STEEL ENGINEER SAYS:

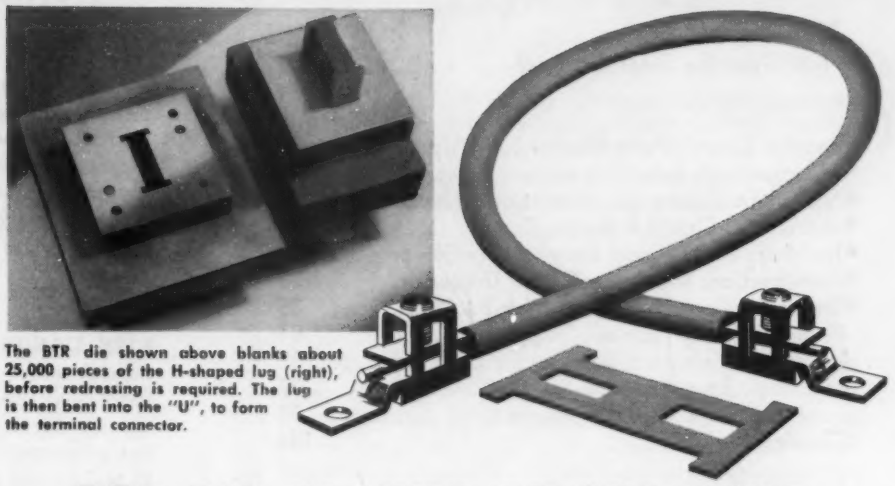
Be Sure to Heat Tools Uniformly

It has always been widely recommended that tools be heated uniformly to the hardening temperature. Unfortunately, this practice is seldom followed.

Absolute uniformity is impossible, as the outer surfaces of a tool must be heated before the interior. The uniformity of heating which results when a tool of constant cross-section is heated, by first preheating and then transferring to a furnace operating at the hardening temperature, is generally satisfactory.

However, when a tool of varying section is encountered (for example 1 in. at one end, and 3 in. at the other end), uniformity of heating cannot be attained by heating in open furnaces. What's the answer? Simply pack the tool in cast-iron chips in a container. Heating through the chips occurs so slowly that the tool can be heated uniformly regardless of section variations.

This procedure can be followed with most types of tool steels — with one exception. With high-speed steels, cast-iron chips cannot be used because the cast iron melts at the temperatures used in heat-treating high-speed steels.



The BTR die shown above blanks about 25,000 pieces of the H-shaped lug (right), before redressing is required. The lug is then bent into the "U", to form the terminal connector.

BTR DIE BLANKS 25,000 LUGS FROM STRIP STEEL BETWEEN GRINDS

One of the parts produced by Pelham Electric Manufacturing Corp., Erie, Pa., is a solderless U-shaped lug, for use on panelboards and switchboards. The lug is blanked from hot-rolled strip steel, ⅛ in. thick. Engineers at the Pelham plant selected BTR for the die, and they've had every reason to be pleased with its performance.

The die, operating in a 25-ton press, has a Rockwell C hardness of 60-62. It's economical, because it produces 25,000 pieces between grinds, with only .008 in. to .010 in. removed in redressing. And it is standing up well on both counts — good wear-resistance and good shock-resistance.

BTR is our general-purpose oil-hardening tool steel of the manganese-chromium-tungsten-vanadium type. In addition to being resistant to wear and shock, BTR has a good reputation for low distortion, and for ease of machining and heat-treatment.

BTR — TYPICAL ANALYSIS

Carbon	0.90	Chromium	0.50
Manganese	1.20	Vanadium	0.20
		Tungsten	0.50

BTR combines abrasion-resistance and toughness, making it suitable for a wide variety of tool-and-die applications.

• • • • • • • • •

Big Babies Turn Out Shell Discs

This huge multiple punch-and-die set blanks 90-mm shell discs, 8⅞ in. in diameter, from .690 gage, C-1030 plate steel. The punches and dies are made of A-H5 tool steel, hardened to Rockwell C 50 to 55. They turn out about 4,500 pieces in an 8-hour turn, and require but a minimum of redressing. A-H5, our 5 pct chrome, air-hardening steel, is well known for durability, minimum distortion in heat-treatment and easy machining.

The Iron Age

Vol. 173, No. 17, April 29, 1954

★Starred items are digested at the right.

THE IRON AGE, published every Thursday by CHILTON CO. (INC.), Chestnut & 56th Sts., Philadelphia 39, Pa. Entered as second class matter, Nov. 8, 1932, at the Post Office at Philadelphia under the act of March 3, 1879. $5 for 1 year, $8 for 2 years in United States, its territories and Canada; other Western Hemisphere Countries, $15, other Foreign Countries, $25 per year. Single copies, 50¢. Annual Review Issue, $2.00. Cables: "Ironage." N. Y.

Address mail to 100 E. 42 St., N. Y. 17, N. Y.

DIGEST of the

NEWS DEVELOPMENTS

SPRING DEMAND FIRMS FARM EQUIPMENT MART—P. 45
Farm equipment is still picking up, but don't expect a landslide. Tipoff on the improved farm market is the recent increase in employment by two major farm equipment manufacturers. Other signs include: Shipments are on upgrade, manufacturers are ordering steel, farmers have been buying wire, roofing.

BURN LIGNITE FOR ALUMINUM REDUCTION — P. 47
Official ceremonies last week launched the world's first lignite-powered aluminum smelter, Alcoa's Rockdale Works. Firm plans to extract byproducts from lignite but commercial value of chemicals is unknown. Aim is to make plant competitive with natural gas. Aluminum used extensively in buildings.

APPRENTICES NEEDED IN SMALL PLANTS — P. 49
One of the top problems facing the U. S. tool and die industry today is the near-critical shortage of thoroughly trained men to fill toolroom staffs. Pinch is intensified by retirement of topnotch oldtimers. Influx from Europe has dwindled to a trickle. One firm demonstrates workable, small scale training.

MACKINAC STRAITS BRIDGE REASONS UNIQUE—P. 52
The Mackinac Straits Bridges which will link Michigan's two peninsulas defies all accepted rules leading to construction of a bridge of this size. It will join no great metropolitan areas, no thriving industrial centers. But reasons were adequate to float a $99.8 million bond issue.

110-MILE COAL PIPELINE PLANS COMPLETED — P. 55
Construction of the first commercial coal pipeline in the U. S. is expected to start this summer. Cost is estimated at well over $10 million for the 110-mile line. But it's expected to pay off by saving about $1.25 per ton on freight bills. More than 2 years of research and development in project.

CHANCES ON INDO-CHINA; STEEL STRIKE — P. 61
We'll be sending troops to Indo-China if the French pull out without making a suitable settlement, or if it becomes obvious French-Viet Nam forces can't hold their own. As contract time nears, there's strong possibility of a steel strike. If settlement raises employment costs, steel companies will hike prices.

the Week in Metalworking

ENGINEERING & PRODUCTION

BASIC LINED CUPOLA IMPROVES QUALITY — P. 85
Inherent advantages of the basic lined cupola have attracted attention of cost-conscious foundrymen. Lining life is increased and less refractory per ton of metal melted is used. Cheaper grades of pig iron and coke may be used. When scrap iron and pig are in short supply, an all-steel mix may be used.

ELECTRONIC UNITS CHECK PART QUALITY — P. 89
Comparative checks on chemical composition, hardness, case depth, plating thickness are quickly made with portable electronic units. Parts tested are checked against a standard specimen for any variations in electrical or magnetic properties. Degree of variations can be correlated with properties being tested.

STORE LIQUID OXYGEN IN VACUUM TANKS — P. 92
New type tanks, built like the familiar hot-and-cold picnic jug, store up to 500 gal of liquid oxygen. One tank load is equivalent to 60,000 cu ft of gaseous oxygen. Just a turn of a valve delivers oxygen under pressure for many industrial uses. Tanks are made of aluminum for easy mobility.

SPECIAL DESIGN OF BROACHES CUTS SCRAP—P. 94
Broaching 0.0005-in. tolerance king pin holes at International Harvester's Fort Wayne plant presented a production problem until specially designed broaches were used. Scrap due to oversize holes, out of roundness and poor surface finish has been substantially reduced. Closer fits provide longer wear life.

ALLOY STEEL, TITANIUM ARE HOT EXTRUDED — P. 98
Industry is rapidly pushing its way into a new metalworking field—the hot extrusion of alloy steels and titanium. To broaden the foundation for engineering knowledge necessary to successful hot extrusion of these metals, Lockheed Aircraft systematically studied the basic problems presented.

NEXT WEEK—TRAPPED RUBBER DIES BOOST OUTPUT
Trapped rubber dies used in a drop hammer and with conventional form blocks have helped one aircraft company boost part production rate and improve part quality. Output was raised from 300 to 1250 pieces per 16-hr day. Engineers visualize future production as high as 1800 formed parts per day.

MARKETS & PRICES

AMERICAN MOTORS CORP. JOINS AUTOMAKERS—P. 46
Final approval of Nash-Hudson merger is just the beginning for American Motors Corp. The firm is to be highly integrated and further acquisitions are expected. But no truck division is anticipated, killing the rumor that Reo might join up. Good will is felt by competitors in auto industry.

CREDIT IS MANUFACTURER'S SELLING TOOL — P. 48
Making things easy for the buyer is good business—it boosts sales, helps distributors. U. S. Steel Homes Credit Corp. set up to relieve dealers of burden and expense of financing operations. Westinghouse also launches credit subsidiary. "Package" mortgage merges cost of home, appliances.

DON'T WRITE OFF THE PISTON ENGINE YET — P. 64
Piston engine men haven't laid down their slide rules and started looking for new fields just because two automotive gas turbine engines have made their appearance. They know they'll have to do more than raise the compression ratio in the next decade. They see opportunities in transmissions, weight, economy.

U. S. CAN HAVE BOTH GUNS AND BUTTER — P. 67
Any direct participation by the U. S. in the Indo-China war will not mean an instant return to federal controls over prices, wages, products, profits. Administration isn't quite ready to disclose this optimistic condition—it wants to double check. But the state of preparedness is excellent.

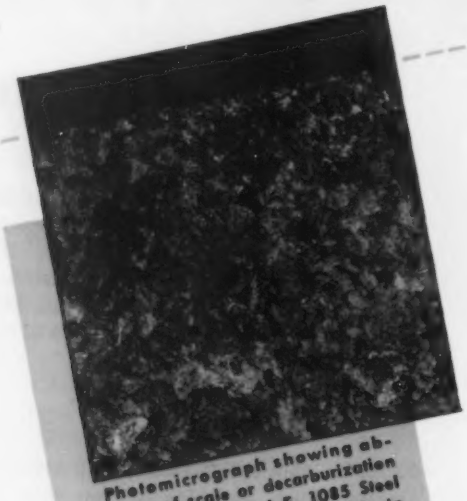
STEEL PRICE CUT FLURRY STIRS DETROIT — P. 127
Close on the heels of a flurry of steel price cuts in the Detroit market last Friday auto steel buyers were quietly testing the market in search of more. Reductions of $1 a ton were made on all products of Great Lakes Steel Corp. Other local producers followed, and out-of-area mills raised freight absorption.

ALCOA-ALCAN DEAL ALLOWED TO STAND — P. 130
Aluminum Co. of America is permitted to continue its purchase of 600,000 tons of metal from Aluminum Co. of Canada. In a consent decree handed down by Judge Knox, Alcoa must offer Olin Industries 40,000 tons per year until '57, 20,000 tons in '58. Alcan must offer U. S. independents 110,000 tons yearly.

NEUTRAL HARDENING

means just what it says . . .

No Scale
No Decarb



Photomicrograph showing absence of scale or decarburization in a section of S.A.E. 1085 Steel (X100) hardened at 1500° F. in a neutral salt bath and quenched in oil. (Etched in 2% Nital.)

Automotive spline shafts being heated in a neutral salt bath equipped with a screw-conveyor mechanism. Temperature at the work is held within 5° F., even in this relatively large bath — 6 ft. long, 2 ft. wide and 2 ft. deep.

For more information on AJAX Electric Salt Bath Furnaces and their many uses — hardening, annealing, brazing, tempering, cleaning, quenching, etc. — metallurgists and metalworking executives are invited to write on their firm's letterhead for the new 72-page Booklet No. 116B.

AJAX ELECTRIC COMPANY

904 Frankford Avenue, Philadelphia 23, Pa.

The World's Largest Manufacturer of Electric Heat Treating Furnaces Exclusively!

Associate Companies: Ajax Engineering Corp. Ajax Electric Furnace Corp. Ajax Electrothermic Corp.
In Canada: Canadian General Electric Co., Ltd., Toronto, Ont.

. . . and an amazing volume of work can be treated in small, relatively inexpensive salt bath equipment.

A neutral salt bath provides an ideal means of heating carbon or alloy steel parts without any deleterious effect on the surface, such as scaling, pitting, carburizing or decarburizing. The bath completely seals out all air while work is heating . . . and a thin film of salt remains when work is removed, protecting it right up to the instant of quenching.

All "protective atmospheres," gas generating equipment and specially trained operators required for their use are eliminated . . . with corresponding savings in initial expense, operating costs and floor space requirements.

Heating cycles are 4 to 6 times faster than in atmosphere or radiant type furnaces — enabling small furnaces to handle a large volume of work — because heat is transferred by conduction rather than by convection or radiation, all surfaces of the work being in direct physical contact with the molten salt. Heating, therefore, is both rapid and uniform . . . eliminating the cause of most distortion.

Unique internal heating principle of the AJAX furnace — utilizing patented, closely-spaced, immersed electrodes — produces an automatic electrodynamic stirring action within the bath which contributes to faster heating of the work and assures a temperature variation of less than 5° F. throughout the bath.

This internal heating feature also permits use of long-lived ceramic pots, avoiding contamination of neutral baths by metallic oxides produced by metal pots.

The advantages of hardening in a neutral salt bath can be further enhanced by use of an isothermal salt bath quench (martempering or austempering) to hold distortion to a minimum and eliminate quench cracking.

AJAX HUTTGREN **ELECTRIC SALT BATH FURNACES**

THE IRON AGE

Editorial, Advertising and Circulation Offices, 100 E. 42nd St., N. Y. 17, N. Y. Oxford 7-3400

GEORGE T. HOOK, Publisher

TOM C. CAMPBELL, Editor

EDITORIAL STAFF

Managing Editor George F. Sullivan
News-Markets Editor Wm. V. Packard
Technical Editor E. C. Beaudet
Asst. Technical Editor W. G. Patton
Machinery Editor E. J. Egan, Jr.
Metal Finishing Editor J. J. Obrzut
Metallurgical Editor W. D. Latiano
Associate Editors: H. W. Van Camp, R. L. Hatschek, W. B. Olson, G. G. Carr, E. C. Kellogg; Assistant Editor: J. R. Whipple; Art Director: Carl Cerminara; Regional Editors: K. W. Bennett, Chicago; R. D. Raddant, Detroit; Robert M. Lorz, Cleveland; J. B. Delaney, Pittsburgh; T. M. Rohan, San Francisco; G. H. Baker, A. K. Rannells, R. M. Stroupe, Washington; Editorial Assistants: L. Brass, M. Perrone, C. M. Markert, J. Dangler; Correspondents: F. L. Allen, Birmingham; N. Levenson, Boston; R. M. Edmonds, St. Louis; James Douglas, Seattle; F. Sanderson, Toronto; F. H. Harley, London, England; Chilton Editorial Board: Paul Wooton, Washington representative.

BUSINESS STAFF

CHARLES R. LIPPOLD
Director of Advertising Sales

Production Manager B. H. Hayes
Director of Research Oliver Johnson
Circulation Mgr. William M. Coffey
Promotion Manager James A. Crites
Asst. Dir. of Research Wm. Laimbeer

REGIONAL BUSINESS MANAGERS

Chicago 2....S. J. Smith, T. H. Barry
1 N. LaSalle St. Franklin 2-0203
Cleveland 14.....Robert W. Watts
1016 Nat'l City Bk. Bldg. Main 1-2263
Columbus 15, Ohio....Harry G. Mumm
LeVeque-Lincoln Tower Main 3764
Detroit 2.....Peirce Lewis
103 Pallister Ave. Trinity 1-3120
Los Angeles 28.....R. Raymond Kay
2420 Cheremoya Ave. Holy'd 7-0741
New York 17...C. H. Ober, C. T. Post
100 E. 42nd St. Oxford 7-3400
Philadelphia 39.....B. L. Herman
56th & Chestnut Sts. Granite 4-5600
Pittsburgh 22.....J. M. Spackman
1502 Park Bldg. Atlantic 1-1831
W. Hartford 7.....Paul Bachman
62 LaSalle Rd. Adams 2-0486
England.....Harry Becker
111 Thorley Lane, Timperley, Cheshire

OTHER EDITORIAL OFFICES

Los Angeles 28...2420 Cheremoya Ave.
San Francisco 11.....24 California St.
Washington 4.....National Press Bldg.

Circulation Representatives: Thomas Scott, James Richardson.

One of the Publications Owned and Published by Chilton Co., Inc., Chestnut & 56th Sts., Philadelphia 39, Pa.

OFFICERS AND DIRECTORS
JOS. S. HILDRETH, President

Vice-Presidents: Everit B. Terhune, P. M. Fahrendorf, G. C. Buzby, Harry V. Duffy; William H. Vallar, Treasurer; John Blair Moffett, Secretary; George T. Hook, Maurice E. Cox, Tom C. Campbell, Frank P. Tighe, L. V. Rowlands, Robert E. McKenna, Irving E. Hand, Directors.

Indexed in the Industrial Arts Index and the Engineering Index.

Society of Business Magazine Editors

Business Publications Audit

National Business Publications

How Goes the Steel Business?

REMEMBER the one about the statistician who drowned while walking across the river? Seems he had been told the average depth was 3 ft. It isn't quite that bad with the steel ingot rate but it could be if you misinterpret the per cent of capacity figure. That's why the American Iron and Steel Institute recently introduced a new steel ingot production index with the 1947-49 average equal to 100.

Because of postwar demand, followed by the Korean War, the steel ingot rate was often in the 90's. The monthly rate was above 100 pct of capacity 3 times in 1949 and 1950; 8 times in 1951; 6 in 1952; and 2 in 1953. War, defense programs and boom times sparked such figures. Steel capacity was increasing at the fastest rate in history—the biggest jump coming between 1952 and 1954 when 15.7 million tons were added!

When the business adjustment got started last year the steel ingot rate began a slow descent. For the first time in years you saw ingot rates below 75 and at times coming close to 65 pct. You were used to seeing them in the 90's for years—except during strikes and for a short time in 1949. Maybe you didn't see clearly why the rate looked so down in the mouth.

The rate dropped because capacity was up sharply in 1954 and because production began to slide as adjustments took place. From 15 to 20 pct of the new capacity is reserve for "emergencies." In terms of civilian demand alone today's capacity would not be needed until about 1958 to 1960. A rate of 65 today would be equivalent to maybe 80 pct under so-called normal conditions.

The steel ingot rate is an old friend. Industrialists, sales managers and statisticians have used it since the turn of the century. It is the basis for valuable figures. It shouldn't be eliminated if for no other reason than that it is a tradition.

Today the ingot rate should be viewed with the new index developed by the American Iron and Steel Institute; that index compares today's output with close-to-normal years. The Institute deserves credit for not eliminating the steel rate when the index was brought out. To have done so would have aroused suspicion and rendered useless valuable statistical data. Too, it would have made it impossible to see at a glance how much reserve we have for world emergencies.

Tom Campbell

Editor

Dear Editor:

Letters from readers

Parity For All

Sir:

We thoroughly enjoyed Mr. Campbell's "Parity For All" editorial in the Apr. 8 issue of THE IRON AGE.

Three or four times a year we send a letter to our customers with one of our latest circulars. We are wondering if the publishers of IRON AGE would permit us to include the editorial in an ensuing letter?

R. M. GERMAN
President

Fox Engineering Co.
Jackson, Mich.

Sir:

Your parity on p. 7 of THE IRON AGE for Apr. 8 must be for a coming depression since p. 103 of the same issue shows an overall profit of 9 per cent for the steel industry in 1953 . . .

The steel industry undoubtedly owes much to the protective tariff, under which it operates, for the 9 per cent profit in 1953. Industry has received this hidden government subsidy for a good many years without a pang of conscience and almost without editorial comment . . .

In lieu of parity, why not adopt a completely open market so that the farmer can buy what he needs in the same type of market that dictates the selling price of his produce.

F. M. LUKENS

Sycamore, Ill.

Sir:

Just read "Parity For All." Congratulations on your clear presentation.

R. C. SCHREFFLER

Oil City, Pa.

Clarification

Sir:

Our clipping service has sent us a copy of the article "Mill Coated Sheets Improve Product Quality" by N. E. Hays, which was printed in your Mar. 25 issue. We refer particularly to the paragraphs under the heading "Advantages of Using Mill Stock," which appears on p. 134. We note that the author says ". . . calcium chloride used on streets and roads may soon make this better protection mandatory."

As you probably know, calcium chloride is merely one of numerous chemicals which are used on streets and roads in winter maintenance procedures for removing snow and ice. For that reason we believe that in future articles of this kind, the author may want to reflect the use of other chemicals.

Furthermore, we believe he may not want to indicate that corrosion comes only from the chemicals used in winter maintenance work; note the enclosed article "Do Salts Used for Ice Control Speed Rusting of Automobiles?" from "Engineering News-Record," May 1951. We refer you to the fourth paragraph of this article and the statement that "the humidity of the atmosphere where a car is kept or parked is a more important factor than salt treatment of roads in determining the extent of corrosion of automobile underbodies."

W. F. REYNOLDS
Editor

Calcium Chloride Institute
Washington

Coating Controversy

Sir:

The article on lead-tin alloy coating in your Mar. 18 issue states that "electroplated coatings of pure tin oxidize within a few weeks to the point where soldering is difficult or impossible."

This statement may have been valid 12 years ago before the advent of continuous electrolytic tinning lines, but for many years tin can fabricators have soldered thousands of tons of electro plate without difficulty. Minimum time between coating and soldering is seldom less than 30 days and storage for 24 months is not uncommon.

W. H. SWISSHELM
Asst. Superintendent,
Tin Plate Dept.

Inland Steel Co.
East Chicago, Ind.

The following references seem to differ with you: "Solderability of Lead-Tin Alloy Plating," by L. H. Seabright, *The Iron Age*, Dec. 8, 1949, p. 93; "Electroplating with Solder," by L. H. Seabright, *Metal Progress*, October 1949, p. 509; "Metal Coatings Improve Solder Flow on Steel and Brass," by D. Wallace, *Materials & Methods*, May 1949, p. 60; and "Lead-Tin Alloy Plating for Solderability," by J. W. Cuthbertson, *Journal of the Electrodepositors Tech. Soc.*, 26, 99 (1950). All of these articles indicate the deterioration of the solderability of tin deposits with time. Mr. Cuthbertson said in his article, "Ageing has a pronounced effect on the solderability of electrodeposited tin coatings, and while thin coatings may solder satisfactorily immediately after plating, they may become almost unsolderable after the lapse of several months."

Finishing Techniques

Sir:

Will you please send me five copies of the article "New Methods For Finishing Powder Metal Parts" which appeared in your Apr. 1 issue.

B. B. BELDEN
Application Engineer

Baldwin-Lima-Hamilton Corp.
Philadelphia

Fatigue Cracks

by William M. Coffey

Modernese (fr.)

Many new houses these days are being built without basements. Seems to be a new idea in housing design. Aside from the fact that people who buy homes without basements run little risk of having to bail them out come the Spring rains, there's another angle to this thing that's been on our mind: *How are people going to build boats in basements that they can't get out of the basement door when they're finished if they have no basements?* Has the fact that basements have disappeared eliminated this fine, old Spring tragedy? In the good 'ole days this was a regular occurrence, even a tradition. Any newspaper editor will tell you he could always count on a good feature every Spring about the boat too big to get out the basement door. We thought that progress had again triumphed—when we were sent a copy of The Pleasantville Press, New Jersey. It reassures us that if there is any possible way to foul things up it will be found by some people regardless of how science plans to avoid it. The story concerns an auto dealer, Bud Hadden (the name itself is significant) who started out in the usual way to build a boat. But Hadden, lacking a basement, built his boat on the sun porch. Goodbye, sun porch.

The only thing that worries us is that we're going sailing a few weeks from now with Horatio Hornblower Hadden.

Mad

Lacking anything better to write about we're going to tell you why we're mad. Bought one of those fine old dollar watches with the famous name (now $3.80 and not so old) for the young sprout for Christmas—the one who's going to be Chief of the Air Force. For Mars, that is. He dropped it, of course, and it ceased to function. Took it to a Watch Repair Man who runs a very pretentious place here in the big city. The Watch Repair Man just looked and *he sneered.* Very contemptuous. Said we could buy a new one for cost in time and labor involved to open it up.

We thanked him for his trouble. Took it back to the office, pried it open, gave the thing inside a spin and she started ticking like Big Ben. Time: 30 seconds.

Second Chapter: Broke our own watch. Walked five blocks out of our way to have it fixed. Moral involved: If you can't fix it yourself don't go to a man that *sneers.*

Mark These Dates

Two very outstanding issues of your ffj are coming up. Some months ago your enterprising editors moved a team to New England. They've probed its metalworking might, pondered its research resourcefulness, looked at its labor force, observed its opportunities. What they uncovered, and that's plenty, is packed into a special editorial feature in the June 24th issue. Salute to New England it's called and it will dig deep into size, scope, facts and figures. That's one of them.

The other is the Metal Finishing Issue, coming July 29. Every metal you can name—with the exception of some in the foundry field—must be finished before it goes to market. So metal finishing cuts horizontally across the entire metalworking and metal producing industry. Competition now demands a good attractive finish at the least cost. Metal finishing has made tremendous strides since the war. To answer a thousand questions on finishing, this issue will present a unique functional correlation of a tremendous mass of hitherto widely scattered data. There will be scores of tables on finishes, plating solutions, stripping, coating tests, corrosion and lots more.

Don't forget—June 24 and July 29. Keep sending the money . . .

Puzzlers

That man walking from the equator in a nor'easterly direction by compass ends up within spitting distance of the North Pole, travels 8484 miles, gets there in finite time and makes an infinite number of trips through 360° longitude. Those who were mostly correct: C. E. Norton, P. A. Smith and Carl G. Browne.

New Puzzler

Here's one sent to us by V. G. Fransioli who gleaned it from the Ceramic Forum. It originally was found in a 1721 notebook of a New Jersey schoolboy:

"A certain man and his wife did usually drink out a vesell of beere in 12 days and the Husband found by offten experience that his wife being absent it would last him 20 days. The question is how many days the wife would be drinking alone?"

BIRDSBORO STEEL FOUNDRY AND MACHINE CO. *says*....

"THIS MACHINE IS well engineered ...easy on the operator

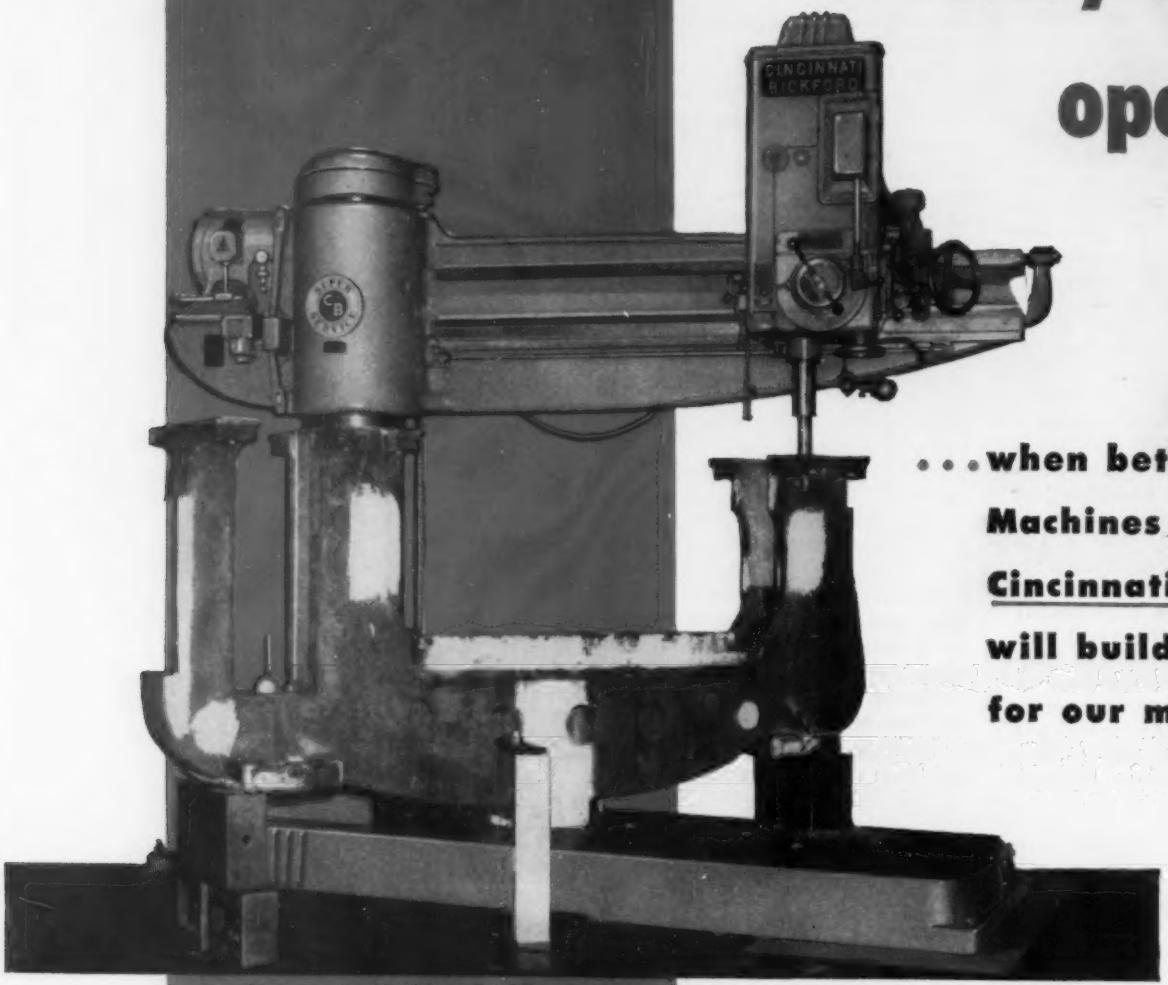


Photo courtesy Birdsboro Steel Foundry & Machine Company, Birdsboro, Penn.

...when better Drilling Machines are built, Cincinnati Bickford will build them for our money"

A 40% cost saving is effected by this Cincinnati Bickford Super Service Radial Drill.

This 10,600 lb. carbon cast steel bottom roll housing for steel plate leveler is being spot faced to a 5" dia. 3/8" deep. Floor to floor time was 25 minutes and now only 15 minutes.

Handling with finger touch ease this Bickford Radial is giving a wonderful performance.

Investigate these fine machines. Write for Catalog R-29.

CINCINNATI BICKFORD

RADIAL AND UPRIGHT DRILLING MACHINES

THE CINCINNATI BICKFORD TOOL CO.

Cincinnati 9, Ohio, U.S.A.

Dates to Remember

Meetings

MAY

ANTI-FRICTION BEARING MANUFACTURERS ASSN., INC.—Annual meeting, May, Westchester Country Club, Rye, New York. Association headquarters are at 60 E. 42nd St., New York.

AMERICAN STEEL WAREHOUSE ASSN. — Annual meeting, May 2-4, Drake Hotel, Chicago. Association headquarters are at 442 Terminal Tower, Cleveland.

NATIONAL ASSN. OF SHEET METAL DISTRIBUTORS—Spring meeting, May 2-4, Roosevelt Hotel, Pittsburgh. Association headquarters are at 1900 Arch St., Philadelphia.

EXPOSITIONS

AMERICAN SOCIETY OF TOOL ENGINEERS — Annual meeting & biennial Industrial Exposition, Apr. 26-30, Philadelphia. Society headquarters are at 10700 Puritan Ave., Detroit.

AMERICAN FOUNDRYMEN'S SOCIETY —Annual Foundry Congress & Show, May 8-14, Public Auditorium, Cleveland. Society headquarters are at 616 S. Michigan Ave., Chicago.

NATIONAL TOOL & DIE MANUFACTURERS ASSN.—Spring meeting, May 2-4, Statler Hotel, Washington. Association headquarters are at 907 Public Square Bldg., Cleveland.

ELECTROCHEMICAL SOCIETY — Annual spring meeting, May 2-6, La Salle Hotel, Chicago. Society headquarters are at 235 W. 102 St., New York.

SCIENTIFIC APPARATUS MAKERS ASSN.—Annual meeting, May 2-7, The Broadmoor, Colorado Springs, Colo. Association headquarters are at 20 N. Wacker Drive, Chicago.

AMERICAN MINING CONGRESS—Coal convention, May 3-5, Netherland Plaza Hotel, Cincinnati. Headquarters are at 1200-18th St., Washington.

ASSN. OF IRON & STEEL ENGINEERS —Spring conference, May 3-5, Bellevue-Stratford Hotel, Philadelphia. Association headquarters are at Empire Bldg., Pittsburgh.

CONCRETE REINFORCING STEEL INSTITUTE — Annual meeting, May 3-8, The Boca Raton Hotel, Boca Raton, Fla. Institute headquarters are at 38 S. Dearborn St., Chicago.

WIRE REINFORCEMENT INSTITUTE, INC.—Annual spring meeting, May 3-8, Boca Raton, Fla. Institute headquarters are at National Press Bldg., Washington.

STEEL JOIST INSTITUTE — Annual meeting, May 4, Boca Raton Club, Boca Raton, Fla. Institute headquarters are at Dupont Circle Bldg., 1346 Connecticut Ave., N. W., Washington, D. C.

AMERICAN WELDING SOCIETY—National spring technical meeting, May 4-7, Statler Hotel, Buffalo. Society headquarters are at 33 W. 39th St., New York.

HYDRAULIC INSTITUTE — May 5-7, Skytop Lodge, Skytop, Pa. Institute headquarters are at 90 West St., New York.

AMERICAN WELDING SOCIETY — Welding & allied industry exposition, May 5-8, Memorial Auditorium, Buffalo. Society headquarters are at 33 W. 39th St., New York.

COMPRESSED AIR & GAS INSTITUTE —May 10-12, The Homestead, Hot Springs, Va. Institute headquarters are at 90 West St., New York.

MACHINERY DEALERS NATIONAL ASSN.—Annual convention, May 12-15, Warwick Hotel, Philadelphia. Association headquarters are at 1346 Connecticut Ave., N. W., Washington.

ASSN. OF AMERICAN BATTERY MANUFACTURERS — Spring meeting, May 13-15, The Greenbrier, White Sulphur Springs, W. Va. Association headquarters are at First National Tower Bldg., Akron, Ohio.

"We have cut in half with

—George P. Edwards

Woodruff & Edwards foundryman removes pattern and uncured shell from the investment box.

Resinox 714, when mixed with fine-grained sand, forms a thin-walled, rigid mold.

Learn how RESINOX 714 can help improve *your* foundry operation!

"We find that the shell molding process helps cut our customers' end-production cost – as much as 75 per cent in some cases," states Mr. Edwards.

A typical example he cites is a part which his company is presently producing at a cost of $3.70 a unit compared to the former cost of $6.90 each. This savings came from reduced machining and less material, with resultant lower shipping and handling costs.

Operator ejects shell from pattern on a shell molding machine built by Woodruff & Edwards.

A leader in shell molding among the midwest's gray iron foundries, Woodruff & Edwards is principally a jobbing shop, and considers its shell molding operation a very profitable venture. They are currently holding castings to a plus-or-minus .003" per inch, depending on casting design, and plus-or-minus .010" per inch across the parting line. And many foundries are finding that thinner sections and more intricate shapes with much finer detail can be cast, using Resinox 714.

Shell molding engineer, Wayne Wright, of Woodruff & Edwards, says, "We have used Resinox 714 in larger quantities than any other resins and find it meets our needs . . . helps produce castings to the most exacting specifications."

Mr. Wright reports *an increase in metal yield,* plus a *large saving in sand handling.* For instance, a 14 x 16 inch shell mold, using

Inspecting the shell after it is removed from the pattern. Note the detail.

The Iron Age
FOUNDED 1855

THE IRON AGE Newsfront

CONSTRUCTION OF A 110-MILE COAL PIPELINE may be started early this summer. Carrying pulverized coal and water, the line will run from Cadiz, Ohio, to a receiving power station in Cleveland. Some sources estimate combined freight saving of $1.25 per ton may be shared by coal producer and consumer.

SHARP REDUCTIONS IN PISTON ENGINE WEIGHT and improved transmission may result from the new threat of the automotive gas turbine engine. Piston engine developers are seeking to offset advantages of the turbine with new designs.

TRAPPED RUBBER DIES used in a drop hammer have helped one aircraft company speed production of aluminum and stainless aircraft sheetmetal parts. Using a fairly hard rubber held in a welded steel die, impact pressures of 22,000 psi are developed.

AUTO BRAKES BASED ON ENTIRELY NEW PRINCIPLES may make their appearance before year end. While auto brakes are generally considered adequate for present cars and highway conditions, development of brakes has lagged behind other auto development.

GREAT LAKES SHIPPERS MAY SAVE $60 MILLION annually when St. Lawrence Seaway is completed. Savings will be effected through development of balanced two-way traffic on the lakes. Elimination of bottlenecks along the St. Lawrence will up annual shipments by 40 million tons.

THIN-WALLED TITANIUM TUBULAR ASSEMBLIES have been successfully spot-welded using an inert gas to prevent atmospheric contamination. The protective argon atmosphere is supplied before and after welding to prevent contamination of the metal.

INDUSTRIAL GASOLINE ENGINES SMALLER THAN 20 HP are being jointly studied by Army engineers and industry to cut models used from 78 to 7. Final aim: To develop a complete new series of small engines adaptable to mass production.

ULTRASONIC AND RADIOGRAPHIC INSPECTION methods have been teamed up at one plant for nondestructive testing of 15-in. thick nonferrous ingots. A 24-million volt Betatron is used.

HOLLOW STEEL PROPELLERS ARE NOW BEING ZINC PLATED on one of the most modern automatic plating conveyor setups in use. Featuring many new engineering designs, the installation automatically recycles blades through the bath to achieve blade balance.

NEARNESS TO RESEARCH FACILITIES is an important factor in plant location. In addition, affinity between certain industries is an important consideration. Example: One machine tool company considers its proximity to electronics research and production a very important and progressive asset.

REGULAR STEELMILL EQUIPMENT CAN HANDLE ZIRCONIUM according to the British who are producing long lengths of zirconium tubing. They extrude a bored ingot at 850° C, then cold pilger. In two passes the 2-in. OD, ¼-in. wall tube is reduced to 1 ¼-in. OD and 0.040-in. wall. Between passes the tube is annealed at 650° C.

CMP

COLD ROLLED STRIP STEEL

OFFERS

a practical way

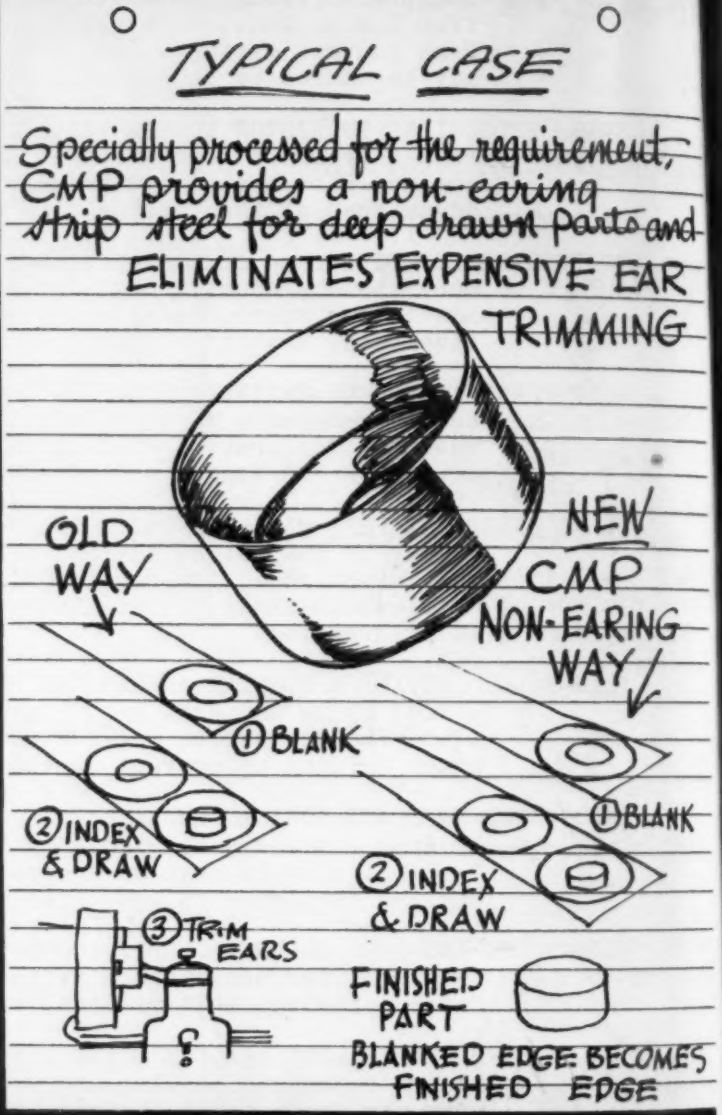
to reduce end-product costs

WITHOUT CAPITAL INVESTMENT

*H*aving ear trouble? If your drawn product requires trimming to remove ears or scallops, you may be able to reduce your end-product cost by the use of CMP non-earing (non-scalloping) cold rolled strip steel.

This is one of many ways in which CMP engineers specifications and processing methods to enable strip steel users to produce better products at lower cost.

Perhaps we can help you to reduce end-product cost without capital investment.



MAY 17-20, 1954 • CHICAGO
BASIC MATERIALS EXPOSITION
THE PRODUCT DEVELOPMENT SHOW

PRECISION COLD ROLLED CMP STRIP STEEL

DON'T MISS BOOTHS 707 AND 711

the Cold Metal Products co.

GENERAL OFFICES: YOUNGSTOWN 1, OHIO

PLANTS: YOUNGSTOWN, OHIO AND INDIANAPOLIS, INDIANA

SALES OFFICES: New York • Cleveland • Detroit • Indianapolis • Chicago • St. Louis • Los Angeles • San Francisco

LOW CARBON, HIGH CARBON (Annealed or Tempered), STAINLESS AND ALLOY GRADES, ELECTRO ZINC COATED ARE AVAILABLE FROM:

THE COLD METAL PRODUCTS CO. OF CALIFORNIA
6600 McKinley Avenue, Los Angeles — Phone: PLeasant 3-1291

THE KENILWORTH STEEL CO., 750 Boulevard, Kenilworth, New Jersey
Phones: N. Y., COrtlandt 7-2427; N. J., UNionville 2-6900

PRECISION STEEL WAREHOUSE, INC.
4425 W. Kinzie, Chicago — Phone : COlumbus 1-2700

Spring Rise Firms Farm Equipment Market

Two major farm manufacturers have upped employment . . . Some producers have been caught by steel shortages . . . Heavy steel buying will come this fall—*K. W. Bennett.*

Farm equipment is still picking up, but don't expect a landslide. Tipoff on the improved farm market is the recent increase in employment at International Harvester and John Deere Co.

Other signs of the farm equipment pickup: Shipments are on the upgrade; price of foundry scrap has been moving up; farm equipment manufacturers have been placing spot orders for substantial tonnages of raw steel.

In addition, farmers have been buying more galvanized sheet, wire, barbed wire.

Overall view is that the farm market hit a low point last November and has improved, or at least leveled off since then.

It was generally believed that farm equipment manufacturers overproduced last year and that dealers were saddled with dangerously high inventories. However, this appears to have been true of the first half '53 only.

Inventories in Good Shape

During the second half of 1953 dealer sales of farm equipment dropped 27.3 pct from first half levels. However tractor production, usually a good indicator of overall farm equipment trends, was slashed 49.2 pct during this period.

The second half inventory correction reduced dealer stocks considerably more than most outsiders realized.

Sales started to increase in late January, early February and industry now generally confirms fact that dealer inventories are in good shape. So far through the year, farm equipment sales are estimated about 25 pct below the same period in 1953.

Farm equipment producers started to cut raw materials inventories sharply last July. This trend continued through December and was responsible for many of the mill cancellations received during that period.

Some Caught Short

But now the raw material inventory correction is complete. At least two major producers have been caught by steel shortages in the past month. These will be corrected within the next 30 days.

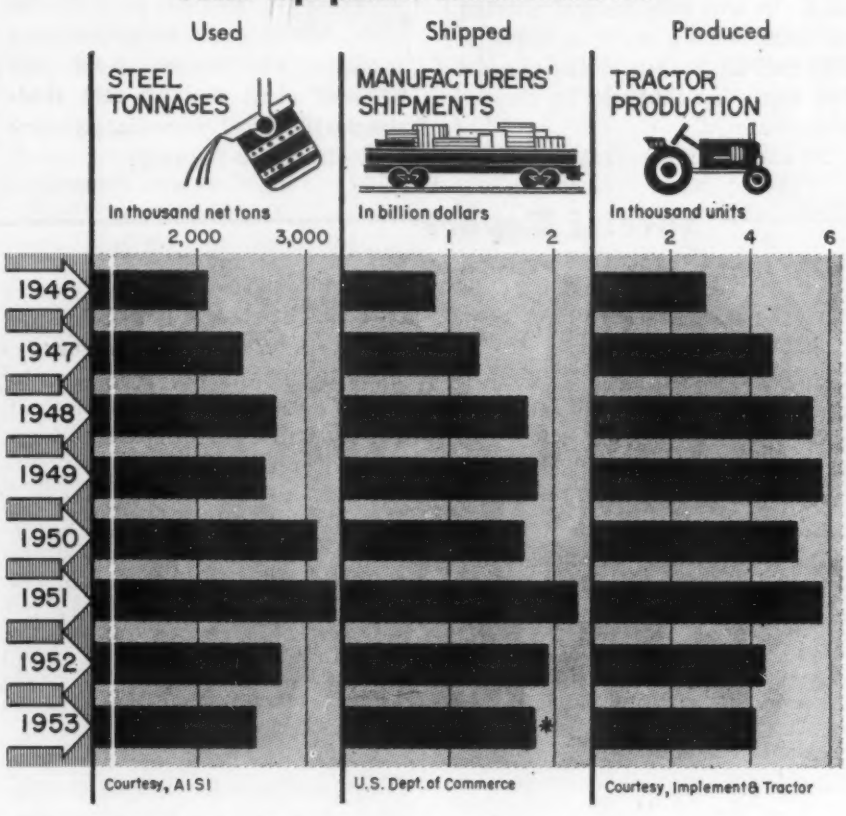
In one case, however, dealers have been unable to get delivery on one type of equipment that was underproduced because the manufacturer figured first half '54 would be worse than it is. Another farm equipment maker found it necessary to up sheet purchases by 5 pct, plate by 15 pct. Bar producers report a mild flurry of hurryup orders for bar steel in the past 45 days.

See Heavy Fall Buying

Purchases of raw steel by the industry are now trimmed closely to going sales, and like sales are running about 25 pct below last year's pace for the same period.

Any forecast of farm equipment sales is subject to sudden revision, but purchasing agents in the industry say fall steel buying (beginning in September and lasting through December) will at least

Farm Equipment Manufacturers



*Iron Age estimate. Final 1953 figures not yet available.

MERGER: American Motors Starts Work

Final approval of Nash-Hudson merger just the beginning . . . Firm will be highly integrated . . . Scotch Reo rumor . . . See further additions—By *R. D. Raddant.*

When George W. Mason lifted his champagne glass in toast to his new American Motors Corp. last week, he had the look of a man who was not winding up a deal, but just getting started.

He and his staff still had hundreds of details to polish off. But more important, he gave the idea that American would not end with the Nash-Hudson merger, that other deals were still to be made.

He conceded that several supplier companies were interested in joining forces, but declined to discuss other automotive independents, several of which have indicated they are willing, if not anxious, to talk.

"American Motors will be a highly integrated company, with its own body plants, foundries, forges, engine, transmission and axle facilities," the Nash president said. "It will take several months, at least, before we can begin to take full advantage of the merger. But many benefits will be derived immediately."

At the announcement press conference, some disappointment was expressed at lack of definite information on organization, personnel to head the Nash, Hudson, and Kelvinator divisions, and other pertinent features of the merger. However, it was believed that there were legal reasons why it was not advisable to comment on detailed plans until the new company officially goes into business on May 1.

Won't Make Trucks

First step will be to integrate manufacturing facilities as rapidly as possible and to work toward the obvious lower costs to be gained by common parts and increased buying power.

Questioned on specific moves, Mr. Mason said that axle and transmission manufacture would probably be shifted to Kenosha, Wis., where Nash manufacturing facilities are located. Nash will probably start making cast Hudson parts almost immediately since Hudson has no foundry.

Mr. Mason said he had been approached by Reo Motors, but it just didn't fit into things because we don't want to become involved in the truck business. Reo had frequently been mentioned as a possible truck division of American, but this statement apparently scotched this rumor forever.

Mr. Mason did not discuss plans for product realignment to avoid the competition between lines that appears obvious between Hudson and Nash cars today. The Hudson Jet has been most frequently mentioned as a casualty of the merger, but officials of the new company refused to admit the Jet is through.

Paradoxically good will toward American was no doubt felt throughout the industry, as even the competition feels that a strong lineup throughout is desirable. Even Ford and General Motors, locked in their sales and production struggle, probably hoped that a strong new company could cut somewhat into the opposition.

GM and Ford's gains have been largely at the expense of the others in the industry and neither has been able to gain much at the other's expense. Each would welcome outside help that is sadly lacking at this stage of the industry.

Special Report

Continued

equal the same period in 1953, more probably exceed it.

One farm equipment manufacturer uses 20,000 tons of steel per year. Normally he carries 6000 tons in inventory. At present he has about 3000 tons and is still buying less than he's using, plans to let his reserve sink to an unprecedented 2000 tons by mid-year. With any kind of upturn at all, his steel situation will call for rapid buying this fall.

Another purchasing agent believes his company will buy about 150 pct more steel this fall than it did last year. These producers, unlike some others, have not yet been caught short. Both will have to move swiftly later this year.

Another major producer plans to buy 10 pct more steel this fall than at present. He's already been pinched by a low inventory.

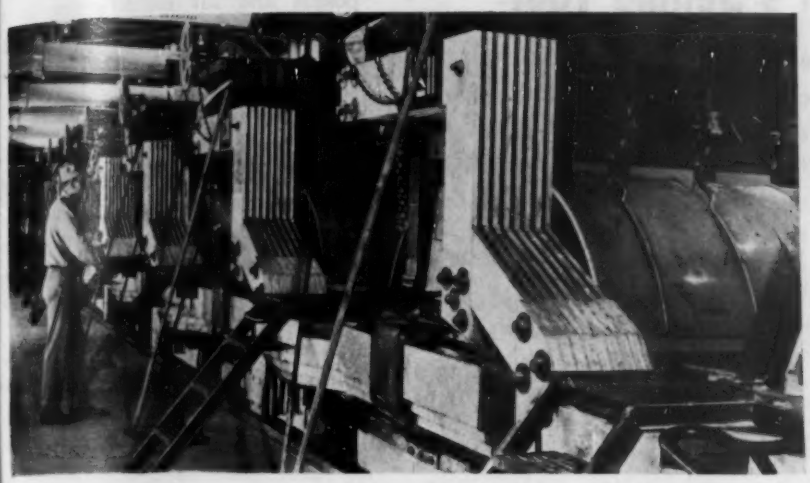
Can't Break Cycle

Contrary to general opinion in January, farm equipment inventories of raw steel can now be regarded as moderate to low. There is no buying based on fear of a steel strike or possibility of trouble in the Far East.

Smaller farm equipment producers are buying less than they're fabricating and are trying to wipe out any excessive finished goods inventories. Larger manufacturers have already had to strengthen their raw steel stocks, particularly plates.

Long range predictions on farm equipment sales for 1954 suggest they will run about 10 pct below 1953. Present steel purchases, as reported above, are 25 pct below the 1953 figure.

Farm equipment, despite strenuous efforts to spread manufacture out to a year-round level, is still seasonal. This means farm equipment producers will scale their steel requirements down during June and July, raise them in August, and hit their peak fall buying of raw materials in October.



BREAKING crust before adding alumina to pot at Rockdale Works.

LIGNITE: Powers Aluminum Smelter

Alcoa sends off Rockdale plant . . . World's first to use lignite for fuel . . . Operate pilot byproduct plant . . . Chemical value still unknown . . . Plant uses aluminum throughout.

Official ceremonies last week launched the world's first aluminum reduction plant using lignite as an energy source. The plant, of course, is Aluminum Co. of America's 90,000-ton-per-year Rockdale Works in Milam County, Tex.

The modern, four-potline smelter produced its first limited quantities of aluminum in November 1952, about a year after construction was started. Power was purchased as the lignite-burning power plant was not ready for even limited use until recently.

Choice of lignite was dictated by a lack of suitable hydroelectric sites and limits on the availability of natural gas. Practicability of using lignite was pointed out by Texas Power & Light Co. which had been doing development work in conjunction with Bureau of Mines.

Studies indicated that use of lignite for aluminum reduction could be competitive costwise with natural gas—something which has not yet been proven commercially—and Alcoa took the leap.

At present, the plant is operating on dried lignite but the eventual aim is to use lignite "char" after extracting byproducts. Pilot operations, using a Bureau of Mines low temperature carbonization process, are already under way at Rockdale. In this method, chemicals are distilled from the lignite tars.

Commercial value of the tars has not yet been established, since they haven't been available in quantities large enough to justify an extensive investigation. Little is known about the products, their chemistry, or how they may be used. Market studies must precede any commercial evaluation.

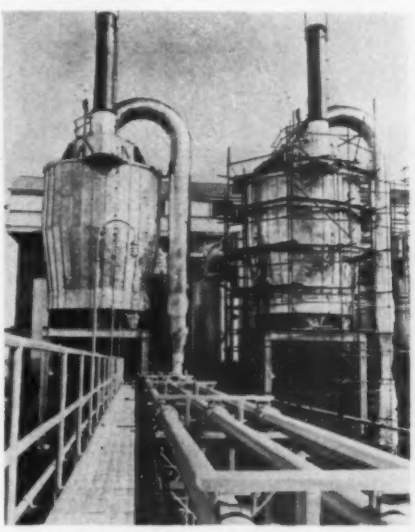
Location of the plant takes advantage of the substantial lignite deposits in the area. Since these deposits contain relatively high percentages of ash and moisture, it would not be economical to transport the fuel any distance.

Lignite is open-pit mined, carried by 62-cu-yd trucks to a belt conveyor system nearly 3.5 miles long, thence to the plant. Nine storage silos hold the lignite until hammer-mill crushers reduce it to minus ¼ in. for the dryers. Crushed lignite is stored in other silos until needed.

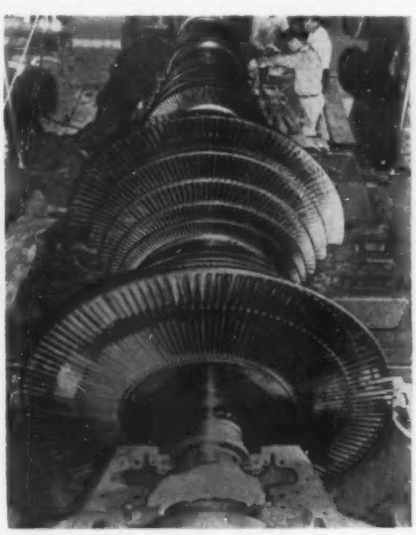
Power plant will be operated by Texas Power & Light. When finished, it will consist of three steam turbine generating units of 80,000 kw each. Two are already operating.

Uses Aluminum Too

Like most of the newer aluminum facilities in the U. S., the Rockdale Works uses aluminum in numerous applications throughout. Potrooms and carbon plants use aluminum for siding, roofing, window sash, ventilators, power lines and bus bars. Aluminum hand rails, stairs, gratings, lighting fixtures, piping and fencing are found from end to end of the plant. Mine truck bodies and supports for most of the conveyor system are aluminum.



LIGNITE dryers are first two installed at power plant.



ASSEMBLING rotor of steam turbine in one of plants' generating units.

CREDIT: Manufacturer's Selling Tool

Making things easy for the buyer boosts sales . . . U. S. Steel Homes, Westinghouse launch credit subsidiaries . . . "Package" mortgages lump homes, appliances—By W. H. Hillyer.

To stimulate business by more and better consumer credit, major suppliers are financing pre-fabricated housing, residential money lenders are including household appliances under the mortgage coverage, and home equipment manufacturers are getting ready for direct-action consumer financing.

A leader in the move to put credit on a mass production basis is U. S. Steel's newly organized subsidiary, U. S. Steel Homes Credit Corp., set up to relieve the company's dealers of the burden and expense of financing their operations. U. S. Steel Homes, Inc., prefabricates plywood-panel house packages at its New Albany, Ind., plant and distributes them to dealers in 35 states who erect and sell them.

Plan Follows Pattern

In addition to its New Albany plant for Gunnison panel type wooden houses, U. S. Steel Homes is completing a new plant at Harrisburg, Pa., for fabricating steel panel homes.

At first glance the U. S. Steel Homes Credit plan resembles customary patterns of financing because it leads through FHA and Veteran's Admin. insurance guaranty to institutional investors. However, the path is smoothed from the beginning and closely connects prefabricator to dealer and dealer-builder to home-buyer. Specifically, the new company will procure buyers for the home mortgages made by the dealer's customers and will supply working capital loans to the dealer himself.

U. S. Steel Homes Credit Corp. has a starting capital of $500,000 —a purely nominal figure in view of the resources of the parent company—available through the medium of the company's corporate owner. The subsidiary will operate principally on short-time commercial bank loans, as most other mortgage organizations do. Company headquarters are in New York, with operations centered at the New Albany plant.

Mortgage Appliances Too

Westinghouse, too is launching a credit corporation. (THE IRON AGE, Mar. 11, 1954, p. 84.) This wholly-owned subsidiary, with an initial capitalization of $10 million, is intended to aid Westinghouse dealers in obtaining inventory and retail sales financing in areas where credit facilities are inadequate. According to Westinghouse president Gwilym Price, the subsidiary company will "supplement, not replace" the present Westinghouse Equity Plan in which some 4500 banks and credit agencies participate.

More help to home owners and appliance dealers alike is contained in the "package" mortgage which merges the cost of home appliances into the real estate loan itself. In this plan both home and equipment costs are consolidated at the outset into one installment program. Though little publicized, the package mortgage has been well received by home buyers.

This scheme works equally well with those who wish to modernize their homes. In this way such items as food freezers, garbage disposals and air conditioning units may be enjoyed by families that could otherwise not afford them and may be profitably sold by dealers who would otherwise not get the business.

Under the long-term financing of the package mortgage plan all such equipment can be included in the builder's contract and in the personal property clause of the mortgage.

American Banker's Assn.'s Savings and Mortgage conference gave package mortgages a nod of approval when the plan was favorably commented on by chairman John J. Mackey.

The overall prospect is for easier home ownership for the consumer, more appliance business for dealers, greater volume for prefabricators and builders and more investment capital at work.

Trade Ins:

Caterpillar makes strong bid for used equipment market.

A promotional program designed to give assurance of quality and long service to the purchaser of used Caterpillar equipment, goes into effect this month for domestic dealers handling Caterpillar Tractor Co. equipment.

According to Gail E. Spain, vice-president, "The company estimates that the program will result in the annual sale of many millions of dollars worth of used equipment."

Purchasers of Caterpillar's "Bonded Buy" used equipment will be assured that machines are fully guaranteed against defective parts for 30 days and that the guarantee is backed by a master bond issued by The Travelers Indemnity Co.

The bond will assure the customer that if the dealer should fail to fulfill his obligation under a "Bonded Buy" agreement, the surety company will make good on any legitimate claim.

The "Bonded Buy" Plan applies only to selected Cat-built equipment, but will include attachments of any make on the machine at the time of purchase.

APPRENTICES: Needed in Small Plants

Supply of skilled toolmakers dwindles . . . Inadequate for future needs . . . No more from Europe . . . One firm demonstrates workable, small-scale training—By *J. R. Whipple.*

One of the top problems facing the U. S. tool and die industry today is the near-critical shortage of thoroughly trained men to fill tool room staffs.

The pinch is intensified by the steady retirement of top notch old timers who learned their trade under strict apprenticeships in Europe. The influx of skilled men from abroad which provided the backbone of the industry 20-30 years ago, has slowed to a trickle.

The depression of the '30s and World War II were major interruptions in the development of skilled young men through apprenticeships.

Survey Shows Need

Although large industrial corporations such as Ford and GM have successfully established full-scale apprentice training, replacement of skilled personnel from within has been particularly lacking in the small plants which make up the bulk of the vital U. S. tool and die industry.

A survey of the aircraft industry showed the trend: The 12 smallest plants in the field had only 86 apprentices collectively while the 2 largest had a combined total of over 300 (THE IRON AGE, Jan. 22, 1953, p. 37).

John Volkert Metal Stampings, Inc. of Queens Village, N. Y., has put into effect what may be a pilot plan of apprentice training, tailored to the needs and resources of small companies throughout industry.

Volkert is a small company (140 employees, approximately $1.5 million annual gross business) specializing in progressive-die stamping of high precision parts for the electronics industry.

Get Production Experience

Originator and guiding force behind Volkert's apprentice program is the company's co-founder and general manager, Jack Kleinoder. Thoroughly aware of the crying need for a supply of well-trained toolmakers throughout the industry, Mr. Kleinoder has served as chairman of NTDMA's Apprenticeship Committee for the past year. He estimates "there are perhaps 200,000 apprentice trainees in all of industry today—in a nation with a working force of over 60 million! We should have at least 2 million apprentices currently to provide for our needs in the foreseeable future."

A unique advantage of the Volkert plan, started in September 1953, with six trainees, is that it not only provides separate classroom and shop facilities but also integrates apprentices training with actual productive work in the company's regular toolroom.

Volkert apprentices spend the first 3 years of the 4-year, 8000-hour program in a separate training shop under supervisor Francis Beck, master toolmaker and longtime Volkert employee with 38 years of experience. Final year of apprenticeship is spent in the firm's toolroom under actual working conditions. During most of the training period apprentices do productive work making simpler dies.

APPRENTICE gets acquainted with shaper in Volkert training shop.

Provide Academic Work

Another important aspect of the Volkert apprentice training is the Related Training Program set up

SURFACE GRINDING instruction by full-time apprentice training supervisor.

—Training—

for the company by Professor Martin J. Bergen of Pratt Institute, Brooklyn, N. Y.

This program, consisting of 3-hour classroom sessions two nights a week, is conducted by a Pratt instructor at the Volkert plant. Approved by New York City Board of Education, the 36-week, 216-hour academic program offers considerably more than other required minimum 144-hour apprentice courses. This training continues for the 4-year apprenticeship period. An unusually wide curriculum includes plane geometry, algebra, technical English, shop theory, blueprint reading, tool making, heat treating.

Screen Out Misfits

Apprentices are regularly enrolled as students in Pratt Institute and satisfactory completion of their courses gives them half the credit necessary for the Institute's Certificate of Product Supervisor in Metalworking.

Investment in each man's training comes to about $7000, Mr. Kleinoder says. Most of this is incurred in the first 18 months of the program; later, productive output of the trainee will more than pay his way including the Related Training course.

Exceptionally careful screening of potential apprentices is Volkert's attempt to eliminate misfits and drop-outs. Candidates are given more than 5 hours of tests to determine intelligence, aptitudes, personality, and basic preferences.

Additional precaution in the shape of a 90-day probationary period is included in the agreement.

Turnover Is Low

As to the unavoidable possibility of losing the company's training investment in men who may leave Volkert soon after receiving their journeymen's rating and are of course perfectly free to do so, Jack Kleinoder is banking on Volkert's low turnover record, high morale.

Turnovers, including retirements, average 2-3 pct of its 140 salaried employees. Also the company pegs wages on the upper end of the scale, above union demands. Working conditions are excellent, with a brand new plant located in a pleasant uncrowded suburb.

Solar Battery:

Bell Labs' unit converts light directly to electricity.

The sun's energy has been converted directly to electricity by a "solar battery." In demonstrating the device, Bell Telephone Laboratory technicians ran a miniature ferris wheel, powered a pair of radio transmitters. Energy sources were the sun and electric light bulbs in different demonstrations.

Another offshoot of transistor research, the demonstration battery is made of ten 2.25 x 0.5-in. specially treated silicon plates, actually large-area transistors. Light striking the surface frees electrons from the silicon, producing an electric current.

Claimed efficiency for the unit is 6 pct, though Bell scientists believe 10 pct efficiency wouldn't be too difficult to attain.

Expect Low Cost

But there are no theoretical limitations to the area of the battery. One square foot of surface would produce about 5 watts when the sun is shining. The way to beat clouds and nightfall would be to charge storage batteries with energy during the day, tap them after dark. This would cut the practical power to about 1 watt per sq ft.

The development isn't ready for large-scale use yet. There are engineering and cost problems still to be surmounted. But the theoretical and experimental groundwork has been done.

Bell scientists say that if they can boost the efficiency to 10 pct, and should the cost of each unit be reduced to about ½¢ by mass production methods, then the cost of a plant would be about $100 per installed kilowatt. And fuel would be free. This compares with an installed cost of about $300 per kilowatt for conventional plants not including fuel bills. Atomic plants would cost somewhat more but fuel would be cheap.

Immediate uses are foreseen in communications applications.

STEEL PILE gets fire, corrosion protection as researchers . . .

Discover Method of Guniting Piles

A successful spraying process has recently been developed that permits steel H-piles to receive a fire and corrosion proof coating of gunite. After years of experimentation, Ben C. Gerwick, Inc., contractors, solved the problem of coating steel piles with gunite and then successfully driving them without disturbing the gunite, a bugaboo that has plagued countless such attempts in the past. The piles are now being driven by Gerwick for a Union Oil Co. Marine Terminal Wharf at Oleum, Calif., and Associated Oil Co. wharf at Avon, Calif.

Gunited In Two Stages

Welded together to give an overall length of 115 ft, the piles were coated with gunite for a length of 65 ft at the contractor's Petaluma, Calif., construction yard. Before the gunite is applied to piles, specially fabricated steel rods are crimped to provide equally spaced nubs along their entire length and tack-welded at these nubs to each side of the H-pile web. These provide means for tying on wire mesh, which is first cut to size, then pressed into shape to fit completely around the piles.

Piles are then gunited in two stages, with a drying period in between. When completed, they have a 2-in. coating of reinforced gunite along their length. After 7 days of drying, the gunite will withstand 5000 lb of pressure.

Entire process is performed under strict control. Even the moisture content of the sand is controlled by passing a flame over it before it enters the hopper. Also, volume of air fed to the sprayers is carefully regulated to secure uniform flow.

The piles are now being driven 55 ft into the bottom of the Bay, with approximately 60 ft of the gunite-coated portion of the pile exposed to the water. They will provide the wharves with the lateral strength necessary to withstand the forces of wind and a 6-knot tide action on docking ships.

MACKINAC: Bridge Reasons Unique

Five-mile bridge links Michigan penisulas . . . Serves no large industrial or metropolitan areas . . . Yet traffic justifies $99.8 million bond issue—By *R. D. Raddant.*

The Mackinac Straits Bridge which will link Michigan's Upper and Lower Peninsulas defies all the accepted rules leading to the construction of a bridge of its magnitude.

It will join no great metropolitan areas. It will serve no large industrial areas. Instead, it will bridge the historic 4-mile stretch of water between the village of Mackinaw City and the Upper Peninsula town of St. Ignace. Their combined population is less than 4000.

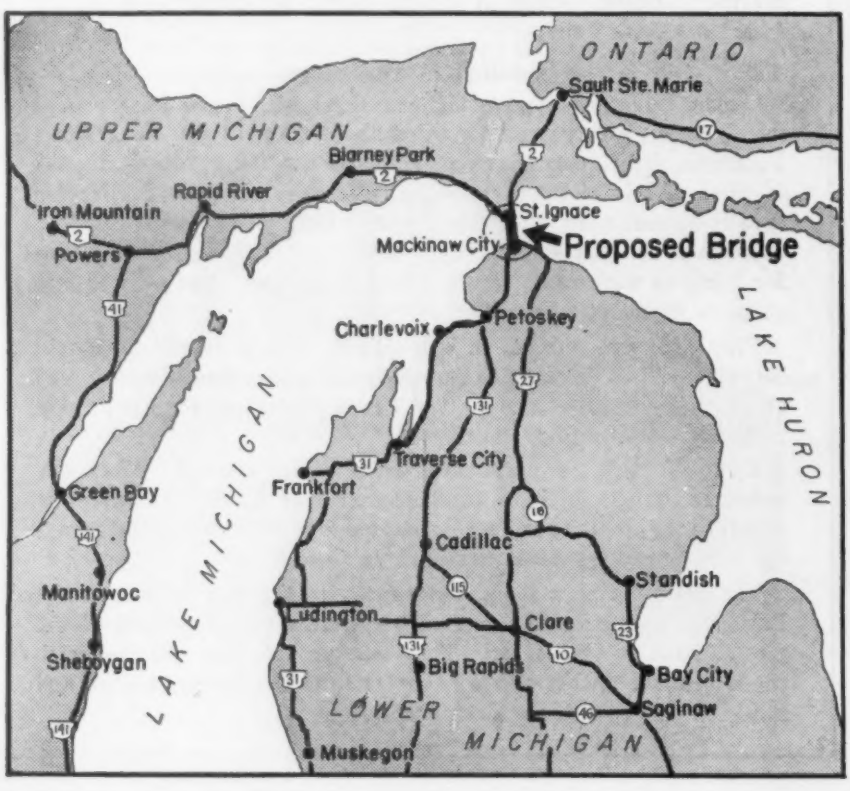
How, then, could revenue bonds for $99,800,000 be sold to finance this structure?

Answer lies partly in the tourist trade, partly in development of the areas surrounding the Straits, and partly in a state sentiment that rebelled at the separation of Michigan's two peninsulas.

Sentiment that led to formation of the State of Michigan Mackinac Bridge Authority is not new. A bridge was advocated as early as 1884 in Michigan papers, one of which described it as a "Great Northwest Passage Through Michigan." But it took 70 years to see the plans completed and the financing accomplished. The bonds were sold early this year and construction was launched immediately. The bridge should be completed by Sept. 1, 1957, in time to handle the thousands of deer hunters who annually line up for miles waiting for Straits ferryboats.

While it would be a gross exaggeration to imply the bridge is being built for the deer hunters, the annual bottleneck served perhaps more than any single factor to spotlight the inadequacy of the ferry system.

At first glance, it would seem that these reasons would hardly justify a $99,800,000 bond issue.



Nevertheless, they were sold at an acceptable interest rate and the State of Michigan pledged up to $417,000 a year for operating and maintenance costs.

Gets Distant Traffic

Traffic studies show that the number of vehicles crossing the straits increased from 440,321 in 1946 to 902,000 estimated in 1953. But with a normal increase in traffic plus an estimated 75 pct increase in traffic induced by the bridge, 1958 bridge traffic is expected to total 1,927,000 vehicles for an estimated revenue of $5,935,000.

It won't be inexpensive to cross the structure. A passenger car will cost $2.10. Each adult toll will be 35¢ and a child 10¢. Buses will be $5, trucks as high as $8.

In contrast to other bridges of similar magnitude, where the bulk of traffic has a nearby origin, most of the Straits' traffic is from distant points. One survey shows that about 10 pct of the traffic from the south came from within a 40-mile radius; 10 pct from between 40 and 135 miles; 16 pct from the central section of the Lower Peninsula; 47 pct from the southern section of Michigan and 16 pct from other states.

Worth the Price

While tolls won't be low, users will get close to their money's worth. The bridge will be 26,444 ft long, including the approaches. Central suspension span will be 3800 ft, second only to the Golden Gate Bridge. Minimum clear height at the center will be 148 ft to allow passage of the largest Great Lakes freighters. Its continuous length over water will be 17,918 ft.

Contract for the bridgework has been placed with American Bridge Div. of U. S. Steel Corp. Superstructure will cost $44,500,000. Merritt, Chapman & Scott Corp. has contracted for the $26-million substructure.

American Bridge Div. is now fabricating the steel caissons which will be floated to the site. Fill work is also being done.

SOLAR FURNACE concentrates heat for researchers as . . .

Sun's Energy Is Put to Use

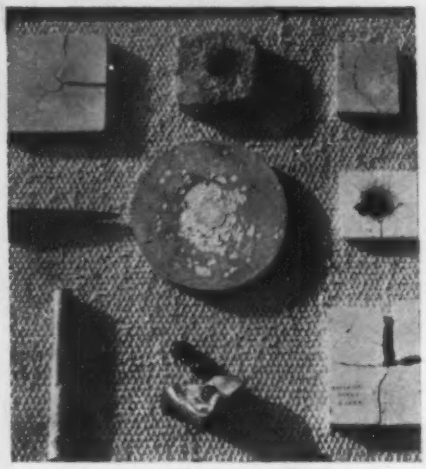
High-temperature metal and material studies are being made with solar energy by Consolidated Vultee Aircraft Co. A 120-in. parabolic aluminum reflector forms a 5/16-in. image of the sun at its focal point, developing temperatures up to 8500°F under an ideal sky.

Advantages claimed include extremely high temperatures, speedy heating and cooling, and absence of electric or magnetic fields and furnace gases.

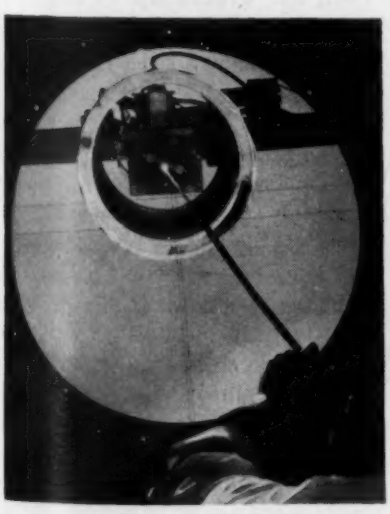
Furnace is mounted on gimbal rings and driven by a synchronous motor to follow the sun's movement. A 22-in. hole in the center and a 20-power telescope give a good view of specimens held at the focal point. Test pieces may be moved as portions melt by a motor-driven screw. Amount of radiation concentrated can be varied by an adjustable sunshade.

Convair is planning to move its solar furnace from San Diego to a nearby mountain top in order to escape haze and clouds which cut efficiency severely.

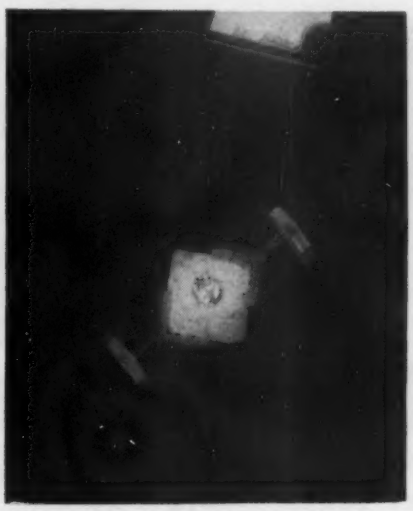
LIGHTING cigarette with flashlight reflector uses same principle.



MATERIALS tested and their melting points include: (Left to right, top row) fused aluminum oxide, 3680°F; firebrick, 3000°F; zirconium dioxide, 4900°F. (Second row) graphite, 6330°F; boron nitride, 5430°F; pressed aluminum oxide, 3680°F. (Bottom row) boron nitride, 5430°F; aluminum magnesium silicate, 3000°F; magnesium oxide, 5050°F.



STEEL reaches white heat in seconds. Cylinder is adjustable shade.



CERAMIC specimen beginning to melt at dime-sized focal spot.

ASBESTOS gloved worker removes piece of ceramic with deep hole.

—**Financial**—

Airframes:

'53 sales hit non-war high . . . '54 will be good, too.

Aircraft business is a good but risky one. Sales for the 12 leading airframe manufacturers last year reached an all-time high for non-war years, but the chances taken by these manufacturers is indicated by fact that cancellation of a single contract caused one major airframe producer to lose 22 pct of its net worth.

Survey by Aircraft Industries Assn. of America (AIA) shows sales of the top twelve firms totaled $5.1 billion in 1953, up 37.2 pct from 1952. After payment of $200.5 million in federal taxes earnings amounted to $116.6 million, compared with $81.7 million in 1952.

'54 Will Be Solid

AIA says earning rate in relation to sales was 2.3 pct, less than half the national average of 5.3 pct for all manufacturing.

It looks as though 1954 will be another solid year for the airframe industry. At the beginning of this year, order backlog for these manufacturers amounted to $11.6 billion.

Estimate is this backlog would last about 2 years at current operating rates, but it is expected that there will be a general decline in production beginning in 1955.

Tool, Die Orders Up 14 Pct

A 14-pct order hike in February boosted backlogs 3 pct for the contract tool and die industry—the first backlog increase since last July. "Scattered reports indicate that this situation is still holding in March and April," according to George S. Eaton, executive secretary of the National Tool & Die Manufacturers Assn.

Activity in this industry is considered a good barometer by many since it produces the tools used by other industries, thus indicating their probable future activity.

January and February shipments were about 10 pct below the corresponding period in 1953.

COAL: Pipeline Plans Complete

Pumping coal-water slurry 110 miles expected to save $1.25 per ton freight . . . Construction should start this summer . . . Cost estimated at $10 million—By *R. M. Lorz.*

Construction of the first commercial coal pipeline in the U. S. should start sometime this summer. Pittsburgh Consolidation Coal Co. officials have completed final plans for the line which will stretch 110 miles from Cadiz, Ohio, to Cleveland.

Results of over 2 years of research and development are now being studied by consulting engineers. Engineering report isn't due for about 6 weeks but Pitt-Consol president George Love said there was no question about the feasibility of the multi-million dollar project. While no official figures have been released some sources believe Pitt-Consol will spend well over $10 million on the line. It is estimated that combined freight savings of $1.25 per ton will be realized by Pitt-Consol and Cleveland Electric Illuminating Co.

Laws Already Passed

When it reaches completion sometime in 1956 the revolutionary underground line will carry a slurry mixture of crushed coal and water to a $2 million receiving station to be built by CEI at its Eastlake power station. Under terms of a contract to be signed by both firms CEI will be the sole consumer using the proposed pipeline.

Enabling legislation has already been passed by the Ohio legislature. Aerial route survey will probably get under way just as soon as engineering experts test the soundness of pilot plant results. Present plans call for laying an 11¾-in. steel pipeline which will accommodate flow of at least 1.5 million tons of coal annually.

Traveling at approximately 8 fps, coal will reach the Cleveland receiving station in about 20 hours. As it pours into the receiving plant a round-the-clock crew will use the most modern equipment available to pulverize and dry fuel which will then be used to power at least four generators.

At present the Eastlake plant has two generators operating and consuming 2000 tons of coal per day. By the time a fourth power unit is added in 1955 daily consumption should reach 4000 tons per day.

Pump at High Pressure

Addition of the third and fourth power units will raise power at the suburban Cleveland plant to 628,000 kw. Ultimately, operating capacity will reach 1 million kw.

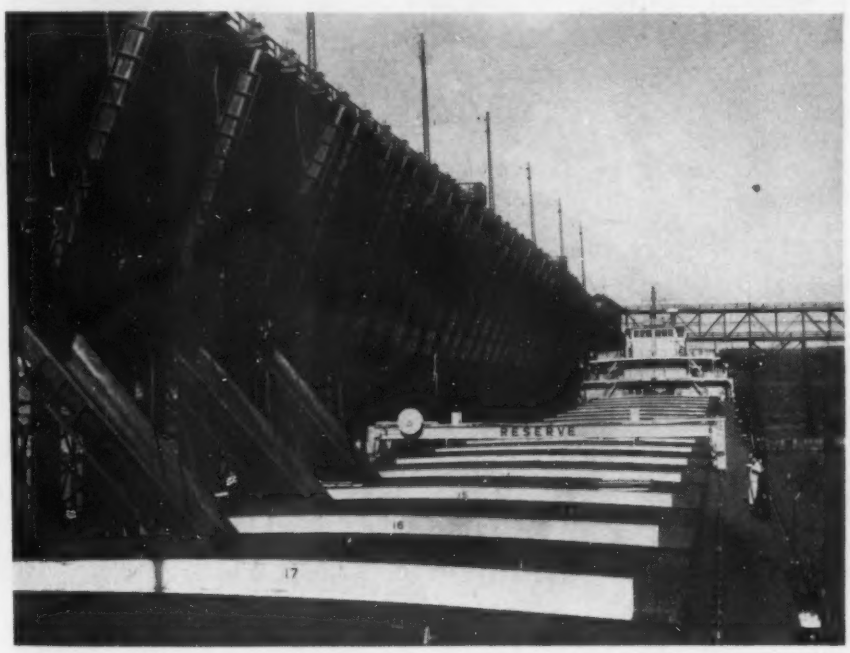
Coal-water mixture will be pumped into the line at Pitt-Consol's Georgetown plant under pressure of 1000 psi. Two booster stations will be set up at strategic spots. Servicing will closely follow present procedures established in maintaining oil and gas lines and chemical additives are expected to eliminate undue corrosion. Engineers familiar with the project say pressure requirements will eliminate possibility of using plastic pipe for transporting coal.

Cut Consumer Costs

Aura of confidence surrounding the pipeline is founded on 2 years of operating experience. Since 1951 Pitt-Consol has operated pilot plants at Library, Pa., and Cadiz. Engineers at Cadiz used a 7-mile loop line and reported satisfactory results. An estimated 7000 tons of coal per day were successfully moved through the pilot line.

Metalworking firms in the northeastern Ohio area will harvest immediate benefits once the line is in operation. CEI officials point out that at least 45 to 50 pct of their normal coal costs are directly traceable to freight charges. If CEI can drastically reduce this overhead, industrial consumer savings should be substantial.

Immediate savings would be possible for large power consumers whose power costs are contractually regulated by escalator clauses



GREAT LAKES iron ore shipping season opened Apr. 19 when the freighter *Reserve* of Columbia Transportation Co. was loaded at Two Harbors, Minn., with 18,000 tons of pellets beneficiated from taconite by Reserve Mining Co. at Babbitt, Minn. Pellets will be unloaded at Toledo.

related to the cost of coal. Reduction of cost of coal shipped from Ohio's St. Clairsville field to Cleveland could push per ton costs down from $3.07 to below $2. With savings like this in the offing proposed line will be a welcome development in Cleveland circles.

May Ship to Lakes

Prospects for growth of this method of transportation seem good. Clarence A. Dauber, Director of Civil and Mechanical Engineering at CEI, told THE IRON AGE pipelines could be buried in practically any section of the country. He also stated that lines of almost any desired length could be efficiently constructed and operated.

Some business leaders in the Great Lakes area are also enthusiastic about future possibility of shipping pulverized coal to Great Lakes ports from Cleveland.

Receive Record Iron Ore Imports

Baltimore area was the largest point of entry for foreign iron ore during 1953, reports American Iron and Steel Institute. A record total of 7.6 million tons was received there.

Delaware river ports of Philadelphia and Morrisville received 1.2 million tons and Mobile, Ala., took in nearly 900,000 tons. The three areas handled 80 pct of all ore imported during the year, though iron was shipped into more than a dozen seaports.

Facilities have been improved and expanded at the three top ore ports and Mobile expects to handle about 3 million tons a year in the near future.

Record tonnages were also shipped on the Great Lakes in 1953, totaling about 106.2 million tons. The Duluth-Superior Harbor —with the largest ore handling facilities in the world — shipped out 64.3 million tons.

On the receiving end of the Lakes, Ashtabula received 11.5 million tons and Indiana Harbor unloaded 7.5 million tons. Expansions and improvements were reported at these three Great Lakes ore ports.

STEEL: Hot Extrude Stainless Shapes

Allegheny Ludlum produces stainless shapes for jets, tin cans by hot extrusion . . . Well suited for short runs, pilot production . . . Grain structure compares with rolled material.

Allegheny Ludlum Steel Corp. is now extruding a variety of stainless steel shapes at its Watervliet, N. Y., plant. Ability to hot extrude tough stainless steel is expected to be a particular boon to aircraft manufacturers (especially extrusion of jet engine rings) and to can producers.

Good for Small Quantities

Use of hot extrusion is particularly adapted to small quantity production.

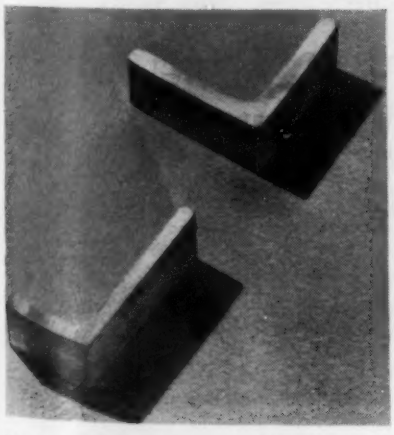
Mills generally are not anxious to take orders for less than 10 tons of a rollable shape to be produced on a rolling mill. Problems on the rolling mill include lost production time for roll changes and expense of cutting special rolls. Unequal leg angles, with varying angularity, are another disadvantage of this method.

Use for Prototypes

The hot extrusion operation, however, can be set up for a relatively small die cost, and there is little production loss involved in changing over from one shape to another on the press.

The comparatively short time required for production of extrusion dies and the small charges involved make the method desirable for prototype aircraft production. Small tonnages can be produced quickly for experimental purposes and the dies are available for larger quantity production later on.

STAINLESS shapes hot extruded at Allegheny Ludlum's Watervliet mill.



HOT EXTRUSION produces good grain structure at lower costs.

A considerable number of different cross sections have been produced by the hot extrusion method for jet engine use. In addition to many applications for rings, one extruded shape is being used for aircraft chain links in place of forged links previously employed. The extruded shape is cut into sections of the desired thickness and drilled at each end to make the chain links.

Check Grain Structure

This method is also being used in tin can production. Two pieces of extruded 316 stainless are joined to make a cylinder in which cans are received and soldered. This part was formerly made of carbon steel, and operations included machining, polishing and chrome plating. Only finish machining of the extrusion is contemplated and it is expected to have much greater life in this application. Grain structure in the extruded material compares favorably with that of rolled material and there have been no major problems with segregation.

Alloy grades being made into shapes at Allegheny Ludlum's Watervliet, N. Y., plant include 405, 410, 403, 430, 303C, 304, 321, 310 as well as of tool steels.

The company expects markets to develop in extruded shapes of high temperature superalloys, titanium and zirconium. Small quantities have already been extruded on the present equipment.

Average Openhearth Size Rises

Increase in the average capacity of openhearth steelmaking furnaces has surpassed even the rapid rise in steelmaking capacity, American Iron and Steel Institute reports.

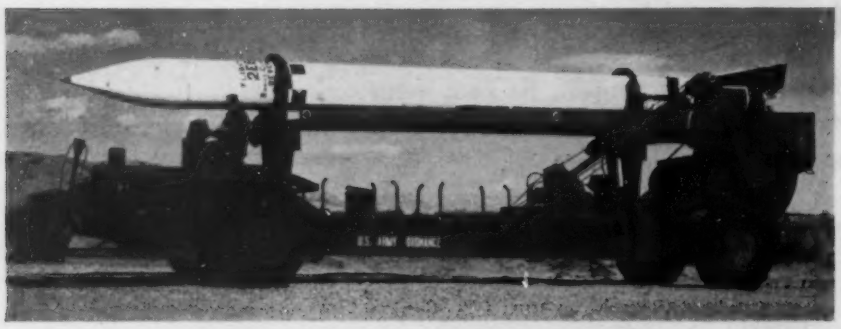
While the total annual capacity of openhearth furnaces at 109 million net tons on Jan. 1, 1954, was nearly 30 pct higher than in 1945, last year of World War II, average capacity of these furnaces per heat had been increased 37 pct, to approximately 160 tons. Despite the many new furnaces built since the war, the total number of openhearths had been reduced to 934 at the beginning of 1954, from 990 in 1945.

AEC Releases 18 More Patents

The Atomic Energy Commission has added 18 more patents to the growing list of non-secret processes available for license to industry. All such patents are available on a non-exclusive, royalty-free basis.

Among the new patents now available for licensing is one for a high-speed camera capable of exposing millions of frames per second.

Requests for licensing of any of the 658 patents now available should be addressed to the Patent Branch, U. S. Atomic Energy Commission, Washington 25, D. C.



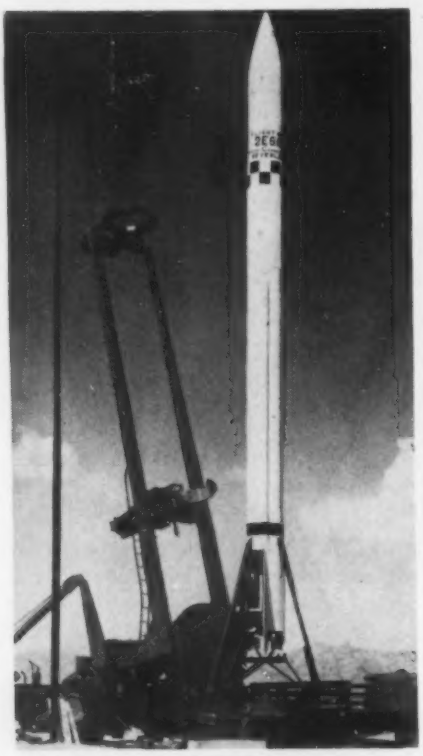
CORPORAL, Army Ordnance's surface-to-surface guided missile.

Missiles:

Combat units to get new rocket and guided missile.

Army combat units are getting two powerful new weapons designed to boost the striking power of U. S. forces in any future ground combat actions.

One is the "Honest John" artillery rocket, a free-flight weapon being manufactured by Douglas Aircraft Corp., Santa Monica, Cal. The second is a guided missile, the "Corporal," produced by Firestone Tire & Rubber Co., Akron, Ohio, and Gilfillan Bros., Inc., Los Angeles.



ERECTOR built into transporter unit sets missile in firing position.

Each is capable of carrying either atomic or conventional high-explosive warheads.

The "Honest John" consists of the rocket itself, weighing several tons; a motor in which the propellant is fitted; and a fin assembly at the rear. It begins its flight from a mobile, self-propelled launcher.

Corporal Is Deadlier

Range of the rocket is equivalent to that of medium to heavy artillery. One round, however, will have the demolition effect of hundreds of artillery shells.

Deadlier yet is the "Corporal," which moves at supersonic speed to hit targets more than 50 miles from the take-off point. Weather and visibility conditions do not restrict the use of this missile in ground combat action.

A light metal pedestal is used for launching the "Corporal," which is then driven by a rocket motor. Guidance equipment is an essential part of gear needed for proper employment of the weapon.

Contracts Reported Last Week

Including description, quantity dollar values, contractor and address. Italics indicate small business representatives.

Repair parts for compressors, 15910, $80,229, Worthington Corp., Harrison, N. J.

Repair parts for gasoline engines, 350, $139,499, Hall-Scott Motors Div., ACF-Brill Motors Co., Philadelphia, Pa.

Shower unit, 20, $105,780, Cleaver-Brooks Co., Milwaukee, Wis.

Deck balk, 1564, $249,560, J. S. Thorn Company, Philadelphia, Pa.

Electronic equip. $351,252 (estimated), Stewart Steel Products, Inc., Brooklyn, N. Y.

Gyro, 463 ea, $104,175, Schwien Engineering Co., Van Nuys, Calif.

Battery, dry BA-205/U, 50778 ea, $67,358, Marathon Battery Co., Wausau, Wis.

Battery, dry BA-405/U, 50778 ea, $67,358, Marathon Battery Co., Wausau, Wis.

Battery, dry BA-407/U 50778 ea, $67,358, Marathon Battery Co., Wausau, Wis.

Signal generator, $118,800, Polarad Electronics Corp., Brooklyn, N. Y.

Actuator, 150 ea, $252,758, The Cleveland Pneumatic Tool Co., Cleveland, Ohio.

Items of fuel control parts AF MIPR R51 83N, Var, $73,617, Bendix Products Div. Bendix Aviation Corp., South Bend, Ind., *G. I. Lyman.*

Retrofit kit and items for same, Var, $53,801, Airesearch Mfg. Co., Div. of The Garrett Corp., Los Angeles, Calif.

Engine parts for P&W engines, Var, $767,490, Bendix Products Div., Bendix Aviation Corp., South Bend, Ind., *G. I. Lyman.*

Maintenance parts used on strut-assy, Var, $113,791, Bendix Products Div., Bendix Aviation Corp., South Bend, Ind., *G. I. Lyman.*

Spare parts for FJ-2 aircraft, 184 ea, $80,003, Vapor Heating Corp., Chicago, Ill.

Maintenance parts used on nose strut assembly, Var, $636,071, Bendix Products Div., Bendix Aviation Corp., South Bend, Ind., *G. I. Lyman.*

Carburetor for 2800 52 W engine, 60 ea, $76,301, Bendix Products Div., Bendix Aviation Corp., South Bend, Ind., *G. I. Lyman.*

Primers, switchboard, 30 ea, $152,015, General Electric Co., Philadelphia, Pa.

Pump assy 217368, 684 ea, $97,141, Hally Equipment Co., Topeka, Kansas.

Auxiliary detonating fuzes, 772075, $800,304, Swank, Inc., Attleboro, Mass.

Auxiliary detonating fuzes, 772075, $853,106, Talon, Inc., Meadville, Pa.

Auxiliary detonating fuzes, 772075, $823,427, Monroe Calculating Machine Co., Orange, N. J.

Cylinder diesel engine, 2, $215,164, Packard Motor Car Co., Detroit, Mich., *R. R. Rees.*

Combined auxiliary feed and booster pump, 4, $329,276, Byron Jackson Co., Los Angeles, Calif.

Combined main feed and booster pump complete with steam turbine, 1, $95,520, Buffalo Pumps, Inc., Washington, D. C.

Fabricated Structural Steel
Contracts, Shipments, Backlog

	Estimated Net Tons		
	1954	1953	Avg. 1947-50
CONTRACTS CLOSED			
March	193,509	258,482	221,387
Year to Date	637,863	706,308	535,549
SHIPMENTS			
March	285,365	266,337	191,297
Year to Date	784,113	758,866	519,377
BACKLOG	1,645,452	2,155,047	1,199,049

Source: American Institute of Steel Construction

REPORT TO MANAGEMENT . .

U. S. in Indo-China if . . .

No matter what high government officials are saying right now, we'll send troops into Indo-China if (1) France pulls out without making a suitable settlement, or (2) it becomes obvious the French-Viet Nam forces can't hold their own. Loss of Dien Bien Phu won't necessarily be the tipoff that this is the case.

French military sources have said they can end the war on their own sometime within the next 2 years. But the big variable in this prediction is how much support Red China plans to give the Viet Minh.

Even if we aren't forced to take an active part in the fighting, look for U. S. to step up its shipments of military goods to the French; possible increase in our defense budget allotments. It's a callous view--but there's no doubt our increased support of the French will stimulate business.

Strong chance of steel strike

With negotiations on a new steel labor contract due to begin around May 1 (current agreement runs out June 30) there's a strong possibility there'll be a strike. Probability of a walkout will increase if steel, general business conditions improve.

Don't believe anyone who tells you the steelworkers won't buy a strike because they can't afford the wage loss. You can be sure that if McDonald blows the whistle, the workers will fall out.

Will steel price rise?

And you can count on a steel price rise if the contract agreement raises employment costs (main issue will be union's drive for increased pension allotment). Industry position in the past has been that steel prices should go up 40¢ per ton for every 1¢ increase in wage costs.

Some pundits are trying to sell the line that steel companies won't be able to get away with a price hike because of the current market softness. This is bunk. Steel company profit margins have been shaved too close to absorb higher employment costs without raising prices. And don't forget--the steel market won't be soft anymore if there is a prolonged strike.

No one ever wins a strike, but a shutdown right now wouldn't be the poleax blow to steel companies that it was in 1952. It would be a drastic but certainly effective way to slice manufacturers' still fairly substantial steel inventories.

Steel warehousemen particularly would benefit from a medium length strike as it would give them a chance to unload their inventories.

Lead, zinc—buy it now

Now's the time to buy if you're in the market for lead or zinc. Prices will continue to go up, mainly because of seasonal consumption. Pushing lead is demand by battery manufacturers, while zinc is being pressed because of farm, automotive need.

Other factors tending to firm lead, zinc prices: recent strength in London; domestic production cutbacks; possibility of government stockpiling.

Industrial Briefs

New Arm . . . CLARK EQUIPMENT CO., Buchanan, Mich., has appointed Materials Handling Equipment Co., Edmonton, Alberta, to sell and service Clark industrial fork-lift trucks and other materials handling equipment manufactured by the company.

Wire Rod Mill . . . HYDROPRESS, INC., Loewy Rolling Mill Div. received an order from Packard Electric Co., Warren, Ohio, division of General Motors, to build a new wire rod mill.

Celebrate 125 Years . . . EGLESTON BROS. & CO., INC., Long Island City, N. Y., is celebrating its 125th birthday. When the firm first started it imported iron strips from Birmingham, England, to cover wooden rails. Today it stocks a wide range of carbon steel products.

Texas Office . . . DRAVO CORP., Machinery Div., has opened an office at 1615 Blodgett Ave., Houston. George R. Beidler has been appointed district sales manager.

Consolidated . . . Minneapolis Iron Store and Nicols, Dean & Gregg have consolidated under the name GENERAL TRADING CO., St. Paul.

Takes Over . . . PITTSBURGH-DES MOINES STEEL CO., Santa Clara, Calif., has taken over operation of Proctor-James Steel Co., San Jose.

Methods Studied . . . Dr. Bruno Calabi, Milan, Italy, has arrived at STANFORD RESEARCH INSTITUTE, Stanford, Calif., and will spend several months studying American methods of marketing iron and steel products.

Hear Ye . . . BALDWIN-LIMA-HAMILTON CORP., Construction Equipment Div., Lima, Ohio, appointed Bradley Equipment Co., 1042 W. Marietta St., N.W., Atlanta, Ga., as distributor for LIMA shovels, cranes, draglines and pull shovels.

Opportunity Knocks . . . GENERAL MOTORS CORP., Detroit, has made available a new career kit designed to inform the youth of the nation of job opportunities in the retail automobile business.

"Atoms for Peace" . . . The Nuclear Engineering Div. of the AMERICAN INSTITUTE OF CHEMICAL ENGINEERS is sponsoring a Nuclear Engineering Congress at the University of Michigan, Ann Arbor, Mich., June 20-25. In conjunction with this Congress an "Atoms for Peace" exposition is planned.

New Site . . . WAGNER ELECTRIC CORP., St. Louis, Mo., moved into a new plant at 614 Lairport St., El Segundo, Calif. Carl Stevens is manager of the automotive branch office, and L. G. Tandberg is manager of the electrical branch office.

Company's Coming . . . SHEFFIELD STEEL CO., Kansas City, will play host to the Central Fabricators Assn. when the group convenes there June 1.

Complete Line . . . ELECTRO REFRACTORIES & ABRASIVES CORP. will display a complete line of products at the 58th Annual Foundry Congress & Show to be held in Cleveland May 8-14.

Distributor . . . PARKER APPLIANCE CO., Cleveland, has appointed Standard Products, Inc., Tulsa, Okla., distributor for Parker O-Rings.

Going Up . . . Officials of PLUME & ATWOOD MFG. CO. and Hackert Construction Co. participated in the formal ground breaking ceremonies for the new Plume & Atwood plant at Thomaston, Conn.

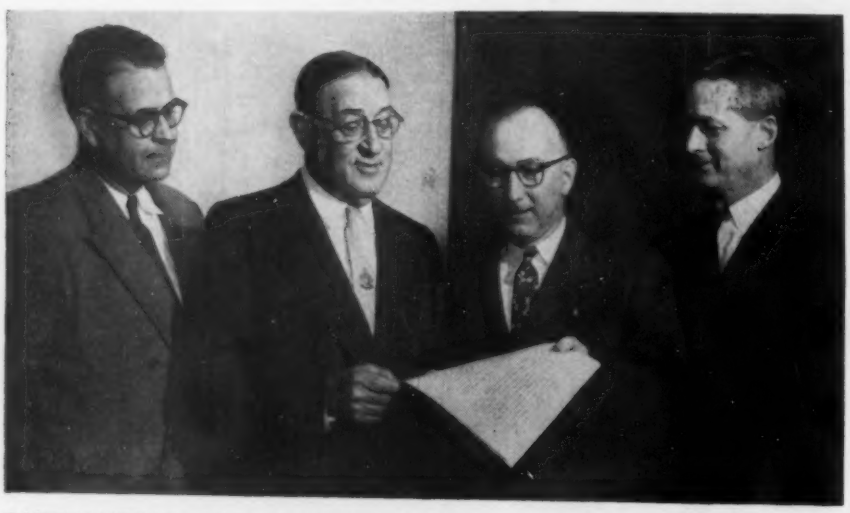
Appointment . . . AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS, New York, has appointed Nelson S. Hibshman as secretary.

Buys Plant . . . REVERE COPPER & BRASS, INC., New York, purchased a plant in Lockport, Ill., for production of lockseam tube, rolled molding and shapes.

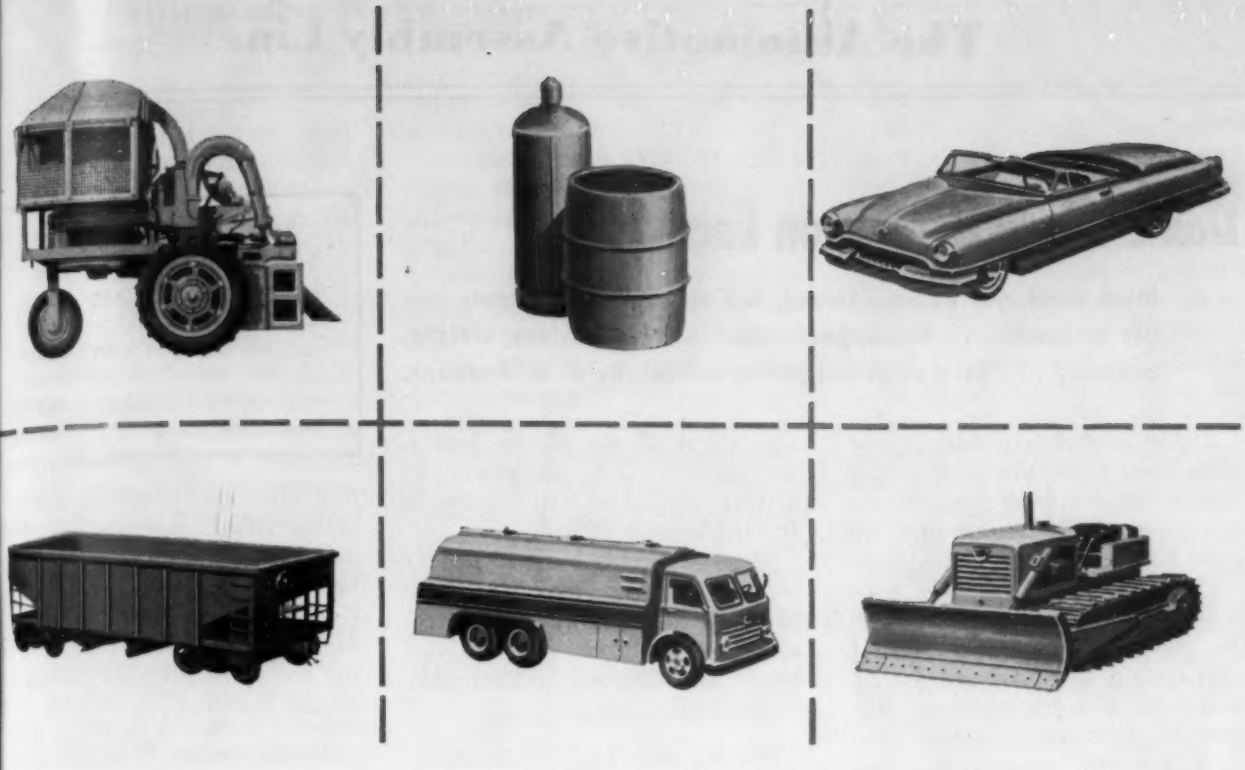
Dividend . . . KEYSTONE STEEL & WIRE CO., Peoria, Ill., declared its regular quarterly dividend of 40¢ a share on capital stock, payable June 5 to shareholders on record as of May 13.

June Meeting . . . The ELECTRIC METAL MAKERS GUILD, INC., will hold its annual meeting on June 3-5 at Moraine-on-the-Lake, Highland Park, Chicago.

Hear Ye . . . Dean George R. Harrison will receive the award of the SOCIETY FOR APPLIED SPECTROSCOPY at its annual meeting in May. The medal will be presented at the dinner to be held at the Hotel New Yorker.



OUTSTANDING CIVIL DEFENSE activities earned Jones & Laughlin Steel Co. the medal here being awarded by Dr. Richard Gerstell, Pennsylvania State Director of Civil Defense (right) to (l to r) Admiral Ben Moreell, J&L board chairman, and W. R. Ramsey, J&L civil defense coordinator. Ross Webb, area civil defense director, watches at right.



Make it **WEIGH LESS** and **LAST LONGER** with

N-A-X
HIGH-TENSILE STEEL

You can design light weight, longer life, and economy into your products by including N-A-X HIGH-TENSILE in your plans.

It is 50% stronger than mild steel.
It is considerably more resistant to corrosion.
It has greater paint adhesion with less undercoat corrosion.
It has high fatigue life with great toughness.
It has greater resistance to abrasion or wear.
It is readily and easily welded by any process.
It polishes to a high lustre at minimum cost.

And with all these physical advantages over mild carbon steel—it can be cold formed as readily into the most difficult shaped stamping.

Sound like something for you? Ask for full facts and think of N-A-X HIGH-TENSILE when you re-design.

GREAT LAKES STEEL CORPORATION
N-A-X Alloy Division Ecorse, Detroit 29, Michigan
NATIONAL STEEL CORPORATION

Don't Write Off Piston Engines Yet

Must meet gas turbine threat, but many improvements can yet be made . . . See opportunities in transmissions, weight, economy . . . Sure of piston performance—By *R. D. Raddant.*

Piston engine men haven't laid down their slide rules and started looking for new fields just because two automotive gas turbine engines have made their appearance.

They know that they will have to do something more than raise the compression ratios of their company's power plant in the next decade to stay in business. But most of them are confident that there are still enough improvements left in the reciprocating, or piston engine to stall off gas turbines for longer than that.

New Type of Competition . . . Principal effect of the gas turbine to date is that it has brought another factor into competition. Where a month ago engine men were only worried about engines in competing cars, today they are worried about the competition of an entirely new type of engine.

The Chrysler gas turbine was somewhat of a shocker in that respect since it claimed performance and economy equal to a piston engine. Implication was that only metallurgical and manufacturing problems remained to be solved. GM's first gas turbine was not intended to be a passenger car engine, but will soon be revealed in a bus.

Confident On Performance . . . Probably the immediate result of a challenge from a new direction is new emphasis by engine developers in the areas where the gas turbine appears to offer its best advantages. This is already apparent in attitudes displayed by some in regard to transmissions, weight, and greater economy.

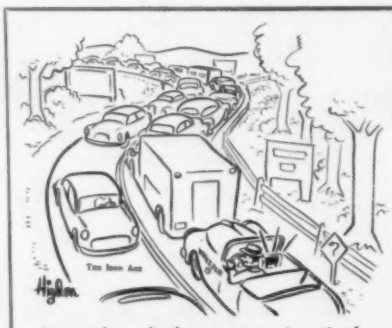
There is little change in attitude on performance. Engine men are confident that they can provide just about all the pickup, power, or "agility" that highways and drivers require or will require in the foreseeable future.

The top engine man of one of the major automakers lists three principal points on where improvements can be made that can add better than 50 pct to performance or economy.

Benefits Will Vary . . . However, when any one or all of these improvements are realized, some of the benefit will go to performance, some to economy, depending on how the industry evaluates the market.

Although there is some disagreement within the industry on this point, better fuels and an increase in compression ratio can result in 15 to 20 pct improvement in economy, if all the benefit is put in this direction.

The difference here is exemplified by the Chrysler position, which strsses performance of its hemispherical combustion chamber engine on conventional gas. General Motors has pushed for higher compression ratios and is the leader in pressing for higher octane gasoline.



"At the slightest touch of the accelator the Whizzer 8 leaps forward with irresistible power. Over hill . . . down dell . . . the countryside flashes by in one vast panorama of farms, forests, fields and foliage. Three-hundred and eighty wild, eager, impatient horses beneath the hood straining at their bits to be off. You'll love the thrilling power . . . the ever-changing scene . . . the . . ."

Transmissions Most Fertile . . . Probably most important in direct relation to the gas turbine is the work being done on transmissions. As one engine man put it, "The gas turbine has a transmission thrown in as a bonus."

Although each automaker claims his transmission is the greatest, he realizes that some of the biggest improvements have to be made in coordinating the transmission to the engine. One authority calls this the most fertile field of development in improving engine economy and efficiency.

He says that improvements of as high as 25 pct can be realized by making the engine and transmission more compatible. Up to now, engine and transmission development have gone on independently with little attention to coordination.

Take Off Weight . . . The third factor is weight. The aluminum engine is still very much in the works and could pare perhaps 200 lb off engine weight. If similar weight savings can be made elsewhere in the car, another 15 to 20 pct in economy or performance could be realized.

Important studies are now under way to determine just exactly what can be saved or improved by weight reduction. These will have a lot to do with determining whether weight savings are worth

Automotive Production
(U. S. and Canada Combined)

WEEK ENDING	CARS	TRUCKS
Apr. 24, 1954..	132,174*	24,665*
Apr. 17, 1954..	125,645	22,914
Apr. 25, 1953..	159,945	34,665
Apr. 18, 1953..	132,325	29,746

*Estimated. Source: *Ward's Reports*

the cost of substituting light metals or new types of construction. Incidentally, the gas turbine offers more in the way of weight reduction, placing the pressure on the piston engine.

Point Out Drawbacks . . . Automakers don't like the implication that no matter what comes along, the industry won't change to a new development until its tooling costs are completely written off. But they stress that improvements must be so good they can't afford not to make the change.

But it should be remembered that the turbine is still in its infancy. Few engine men will predict farther ahead than 10 years, and by that time anything can happen. It's still a good bet that the last piston engine programs are now being completed and only minor modifications will be made until turbines come.

Freight:

Dealers use driveways, tow-bars to cut shipping cost.

Over a big lot loaded with new cars in Detroit is a sign reading: "Free transportation anywhere." This lot and others of a like nature may hold one of the keys to the auto "bootlegging," or it can be a way a dealer saves himself a high percentage of transportation costs.

It is no secret that dealers in areas far removed from Detroit dislike paying the high transportation costs, particularly in tough sales years when a customer is likely to rebel against a freight bill of over $300 to the West Coast.

What It Saves

This particular lot is a driveaway, although a tow-bar man can drive one and tow another for a set fee. Tow-bars and driveaways are known as "irregulars," but are contracted for by franchised dealers and bootleggers alike seeking to avoid the high freight rate.

How much can be saved? *Automotive News* in a tabulation of hauling charges show these typical comparisons for various types of hauling charges.

Detroit to Los Angeles for a typical small car — tow-bar, $150; driveaway, $75; factory charge, $281.

Detroit to Baltimore for a large model — tow-bar, $45; driveaway, $30; factory, $92.

The difference between tow-bar and driveaway is that the former may own his own tow-bar and do it for a fee, while the driveaway man takes his compensation in free transportation. Major risks are reliance on an unknown driver plus the fact that the car owner must carry the insurance.

The Detroit Notebook . . .

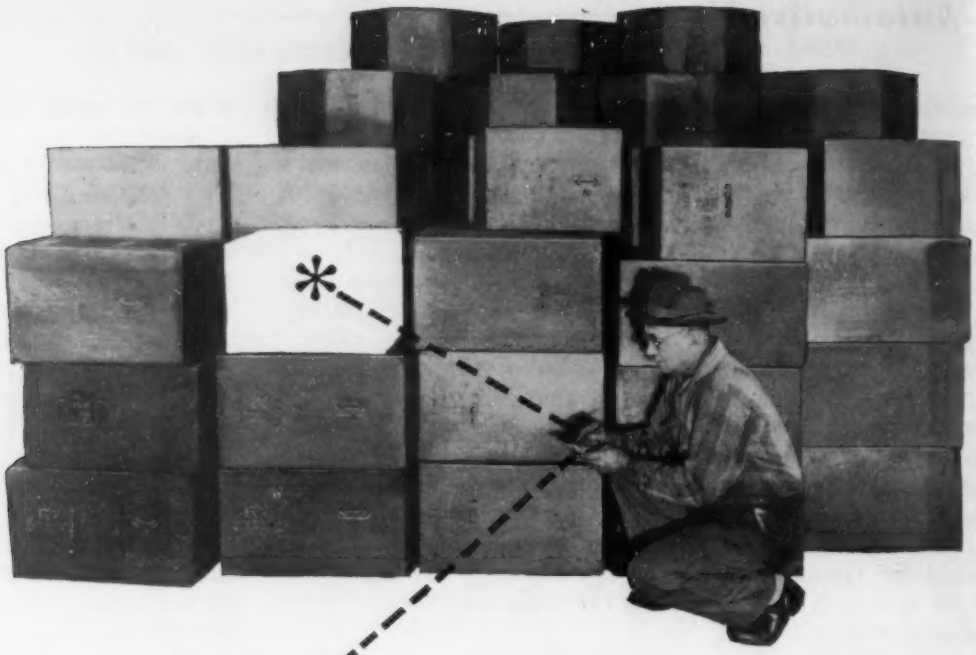
. . . A lot of confusion resulted in Detroit last week from a Dodge dealer committee meeting. Amid conflicting reports, the dealers were reported to have demanded a $200 per car cut in price to the dealer. Chrysler Corp. remained unruffled, however, radiated confidence at a stockholders meeting later in the week, and acknowledged no really serious protest.

. . . Look for more pressure from automotive steel buyers for price cuts following the reduction last week by Great Lakes Steel, largest supplier of flat-rolled products for the industry. Although the cut was attributed to a competitive situation on freight, automotive buyers hoped it would be a break in the price front. And in Chicago, Inland Steel Co. said it would absorb $1 more of freight to Detroit customers when necessary to meet Great Lakes price.

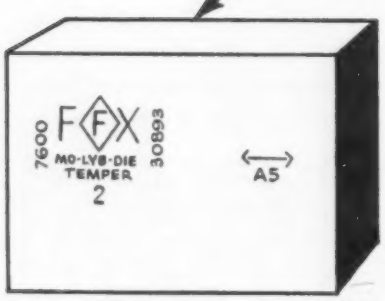
. . . Ivan L. Wiles, Buick's general manager, reports that more than 55 pct of his division's total production is devoted to hardtops. Buick introduced the hardtop in 1949, now is the biggest producer of the model.

. . . Ford Motor Co. awarded the general contract for construction to its new 12-story administration building to the Bryant & Detwiler Co., Detroit. The new building will be located about 2 miles west of the present administration building in Dearborn and should be completed by late 1956.

THE BULL OF THE WOODS — By J. R. Williams



Finkl Die Blocks have your number



The entire history of a Finkl die block is hot stamped on its side. For instance, #7600 is the heat or melt number used to fill the order. #30893 is the production number. The FX and Diamond F is the trademark of the special steel used. Temper 2 signifies the hardness to which the block is heat treated. The arrow shows the direction flow of the metal as a guide for die sinking. The A5 under the arrow indicates the block location in the ingot runout.

All of this means that we process our forgings and die blocks according to the requirements of you, our customer, with a complete file checking each step from molten steel to finished product. It also means that when you receive a Finkl forging or die block it can be used with confidence. It will do your job and do it well. When you need quality and service specify Finkl forgings and die blocks.

For technical assistance or further information concerning your forging problems, call or write your nearest Finkl District Office.

DETROIT 26: 2838 Book Bldg. WOodward 1-1315 • **CLEVELAND 14:** 1914 NBC Bldg. CHerry 1-2939 **PITTSBURGH 22:** 762 Gateway Center. ATlantic 1-6391 • **INDIANAPOLIS 5:** 132 East 30th Street. HICkory 4647 • **HOUSTON 1:** PO Box 1891. CAPitol 2121 • **ALLENTOWN:** 737 North 22nd Street. HEmlock 4-3333 • **ST. PAUL 1:** 445 Endicott Bldg. CEDar 1600 • **COLORADO SPRINGS:** 534 West Cheyenne Road. MElrose 2-0431 • **SAN FRANCISCO 5:** Monadnock Bldg. EXbrook 2-7018 • **SEATTLE 4:** 3104 Smith Tower. SENeca 5393 • **BIRMINGHAM:** PO Box 1606. 7-1603 • **KANSAS CITY 6:** 950 Dierks Bldg. HARrison 1060 • *Western warehouse* **LOS ANGELES 29:** 1001 North Vermont Avenue. NOrmandy 3-2141 • *Eastern warehouse* **EAST CAMBRIDGE 41:** 250 Bent Street. ELliot 4-7650

1879 F 1954
75th ANNIVERSARY

A. Finkl & Sons Co.

2011 SOUTHPORT AVENUE • CHICAGO 14

FORGINGS • DIE BLOCKS • ELECTRIC FURNACE STEELS

U. S. Can Have Both Guns and Butter

Could fight in Indo-China without controls on industry . . . Preparedness status excellent . . . Most stockpiles high . . . But all-out war could bring curbs fast—By G. H. Baker.

Any direct participation by the U. S. in the Indo-China war will not mean an instant return to federal controls over prices, wages, products and profits. The Eisenhower Administration is not quite ready to disclose this optimistic condition. It is doing some very careful checking to make sure it has not tripped up in any of its calculations pertaining to industrial mobilization.

In Good Shape . . . Basically, the U. S. today is approaching tip-top form in its state of military preparedness. The productive capacity of America's industrial plant and equipment has been increased enormously since 1950. And the total capacity to produce goods and services is still growing, thanks to the careful planning of industry and the nudging and prodding of Washington's top mobilization chiefs.

Stockpiling of materials—both raw materials and semifinished and finished products—has made vast strides since the beginning of the "forced draft" federal storage program in 1950. With the exception of a few scarce commodities such as nickel, the U. S. stockpile is today a hefty arsenal of both military and civilian-type supplies that could feed and sustain the sinews of another wartime economy for many months until war production reached its peak.

Both Guns & Butter . . . Today's mobilization picture, therefore, is far different from the one facing the U. S. at the time this nation entered the Korean war. It is entirely likely that the country could today support a guns-*and*-butter economy indefinitely. The great Korean handicap — mobilization from scratch — today does not exist.

In the Indo-China war, of course, the U. S. ability to fight a war without tight controls over the domestic economy would depend directly on the magnitude of the military operation. Should that essentially "local" war suddenly fan out across southern Asia, all bets would be off. All-out controls then would be in order—and fast.

Raise Nike Umbrella . . . Ten key industrial cities, tagged by the Army as "especially vulnerable" to enemy air attack, will soon be under the umbrella of Nike (guided missile) protection.

The Army has been quietly buying and leasing land—sizable acreages — around the 10 selected cities. In the Detroit area, for example, the Army is authorized to acquire outright 227 acres, arrange for easements on another 726 acres, and lease 319 acres. Around Seattle, the Army will acquire 195 acres, plus easements on another 1348 acres.

Site locations are secret. It is probable that multiple locations around each city, rather than one single location, are involved.

Who Gets It . . . The 10 cities around which Nike anti-aircraft equipment is being installed or is to be installed: Boston, New York, Philadelphia, Washington, Norfolk, Pittsburgh, Detroit, Chicago, Seattle, and Los Angeles.

Other Nike installations are being pushed forward at locations on government reservations, such as military posts. But these situations are not directly related to the defense of industrial areas, as is the case of the 10 cities.

Jobless Still Problem . . . Nationally, the number of employed workers continues its slow but steady rise. But on a regional basis, unemployment still is a serious problem.

Just after it had declared three more areas in Michigan and Wisconsin as eligible for special treatment in obtaining defense contracts, the U. S. Labor Dept. announced the beginning of a detailed examination of the existing unemployment picture. A 7-man government committee has begun conferences with industry and labor officials in a move to cure the unemployment ills that plague several dozen areas.

The three new areas to receive preference in government contracts have unemployment of 6 pct or more in their labor forces. Areas are the Jackson and Ann Arbor-Ypsilanti areas in Michigan and the Iron Mountain area in Michigan and Wisconsin.

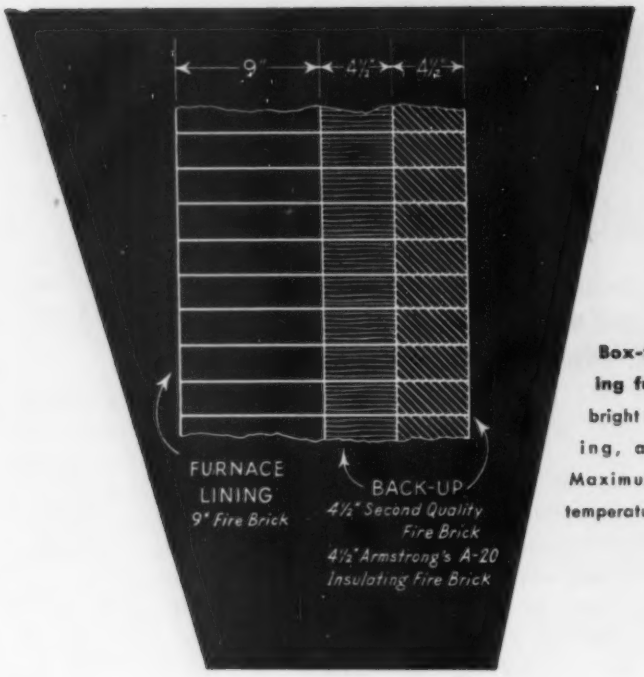
How Much? . . . Actual cost to the Army of a current program involving repair of 6420 faulty transmissions for medium tanks is unknown, according to newly-disclosed official testimony to Congress.

Turn Page

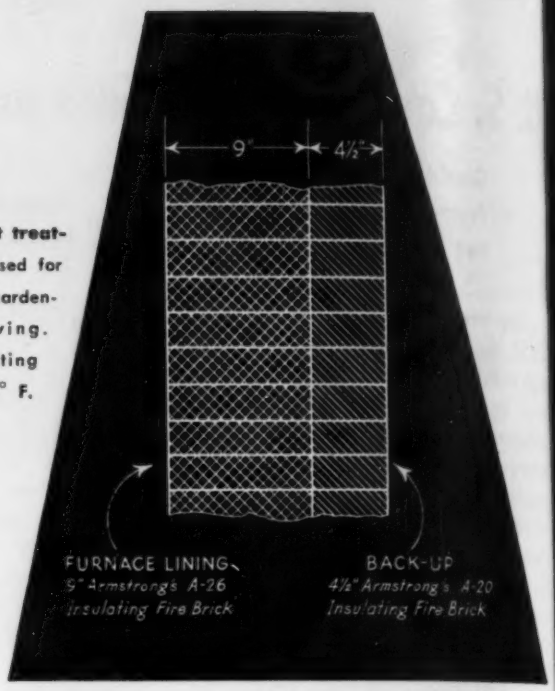
No Nickel Recontrol Now

Washington has no immediate intention of recontrolling nickel, a top government official has told THE IRON AGE. Threat of full-scale U. S. participation in the Indo-China war has given rise to reports that the Federal Government is ready to re-apply inventory and use controls over nickel and other materials in short supply.

But top mobilization officials are not planning any changes in the existing control picture. Federal control agencies are very much aware that nickel is still short. Market conditions are studied weekly. No immediate recontrol action is in the works, however.



Box-type heat treating furnace: used for bright brazing, hardening, and drawing. Maximum operating temperature: 2500° F.



How a 25% reduction in wall thickness lowered heat storage by 77%

This box-type furnace illustrates how a simple change in wall construction can often produce valuable reductions in heat storage and heat loss.

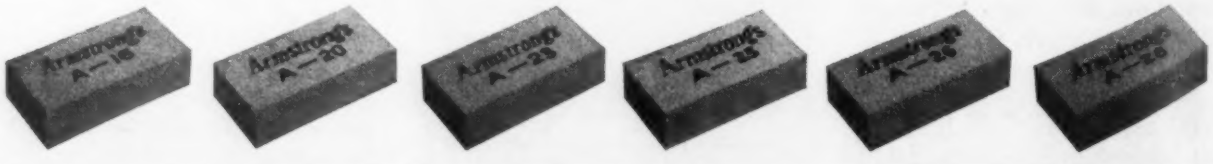
In the first design, 9" of regular fire brick line the walls. For back-up, 4½" of second quality fire brick and 4½" of Armstrong's A-20 Insulating Fire Brick have been used. With this construction, heat storage is 90,730 Btu's per square foot of wall area, while heat loss through the walls is 505 Btu's per square foot. The weight of the walls is 164 lbs. per square foot.

Note the improved performance of the second construction. Here, 9" of Armstrong's A-26 Insulating Fire Brick have been substituted for the 9" fire brick lining, while the back-up is 4½" of A-20. With this more modern design, wall weight is only 48 lbs. per square foot . . . a 70% reduction. Heat loss through furnace walls is cut by 28% to 362 Btu's per hour per square foot.

Most important of all, heat storage is reduced 77%—to only 20,860 Btu's per square foot. In a utility furnace of this type, this reduction means valuable fuel savings, faster operating cycles, increased production.

Do you have a furnace problem?

Getting top operating efficiency from a furnace calls for a sound knowledge of fire brick and furnace construction. That's why it's always a good idea to call in your Armstrong engineer whenever you have a furnace lining or rebuilding job. He'll be glad to help you select the best brick to suit your needs. For his help, call your nearest Armstrong office or write Armstrong Cork Co., **2704** Susquehanna St., Lancaster, Pa.



ARMSTRONG'S INSULATING REFRACTORIES

As reported in THE IRON AGE of Mar. 11, p. 85, the work on the tank transmissions necessitates use of both military and civilian mechanics. This fact, says Brig. Gen. J. B. Medaris, chief of the industrial division, office of the Chief of Ordnance, makes it hard to compute the actual expense involved.

Gen. Medaris recently told a House Appropriations subcommittee that General Motors, manufacturer of the transmissions, has provided crews to help in making the required change in the retaining screw assemblies. He noted that the civilian mechanics had been particularly helpful in repairing those units issued to troops at Ft. Hood, Tex.

Not All Loss . . . Corrective work includes disassembly of transmissions, the staking of a retaining screw, and reassembly. Originally, staking was performed by the manufacturer, but beginning in March 1953, GM was permitted by the Army to substitute torqueing for staking.

In the Army's view, not all the transmission repair work should be considered as lost effort. It has been pointed out that the program is giving many Army mechanics practical training in field maintenance of tanks.

Step Up Grain Bin Building

Storage bins with a total capacity of nearly 100 million bu will be built by 11 companies as a means of relieving what the government calls a "serious" grain storage situation.

These new facilities, contracted for in mid-April by U. S. Agriculture Dept., will meet part of an anticipated 150-million to 250-million-bu shortage of space for this year's grain crops. The 22,916 bins will be located chiefly in Kansas, Colorado, Montana, and the Dakotas.

Including the bins to be built, federal bin capacity is approaching 735 million bu.

Holders of the new contracts are Great Lakes Steel Corp.; Steel Co. of Ohio; Butler Mfg. Co.; Black, Sivalls & Bryson; Western Engineering & Contracting Co.; Burnell & Sons; Timmerman Lumber Co.; Rilco Laminated Products; Lloyd R. Reeve; Western Silo Co., and Dickinson-Leck Co.

Ask Scrap Freight Rate Cuts

Eastern railroads are called upon in an official complaint to the government to cut their rates on iron and steel scrap to 50 pct of the rates on manufactured metals.

In a complaint filed with Interstate Commerce Commission by Institute of Scrap Iron & Steel, the roads operating north of the Ohio River and east of the Mississippi River are charged with imposing unreasonable and discriminatory freight rates on scrap iron.

It is pointed out that freight rates on scrap have been increased 10 and 15 pct, while the roads have reduced the rates on a number of iron and steel products by about 20 pct. It is "unreasonable and incomprehensible" to maintain rates that permit finished products to move at lower rates than does the raw material used in the finished products, the Institute says.

About 5000 tons of scrap is going to city dumps each month because high freight rates make it uneconomical to ship scrap to collection points.

"Here's the dictionary . . . that's a government contract."

Seek Broader Jobless Benefits

Broader coverage of the federal-state unemployment benefits program is proposed in a new bill (H.R. 8857) introduced in Congress by Chairman Daniel A. Reed, R., N. Y., of the House Ways & Means Committee.

This measure would provide jobless compensation coverage to enterprises employing one or more workers in industries already included in the overall plan. The present law extends only to firms employing eight or more persons for 20 weeks of the year.

Some 3.4 million workers not now eligible for unemployment benefits will be brought within the system if this proposed change is actually put into effect.

Mr. Reed submitted H.R. 8857 as a means of implementing the President's proposal. In late April, no hearings on this bill had been set by Congress.

Toolmakers Bow to Justice Dept.

Three manufacturers of milling machines have agreed to terminate trade practices which the Justice Dept. says are in violation of the antitrust laws.

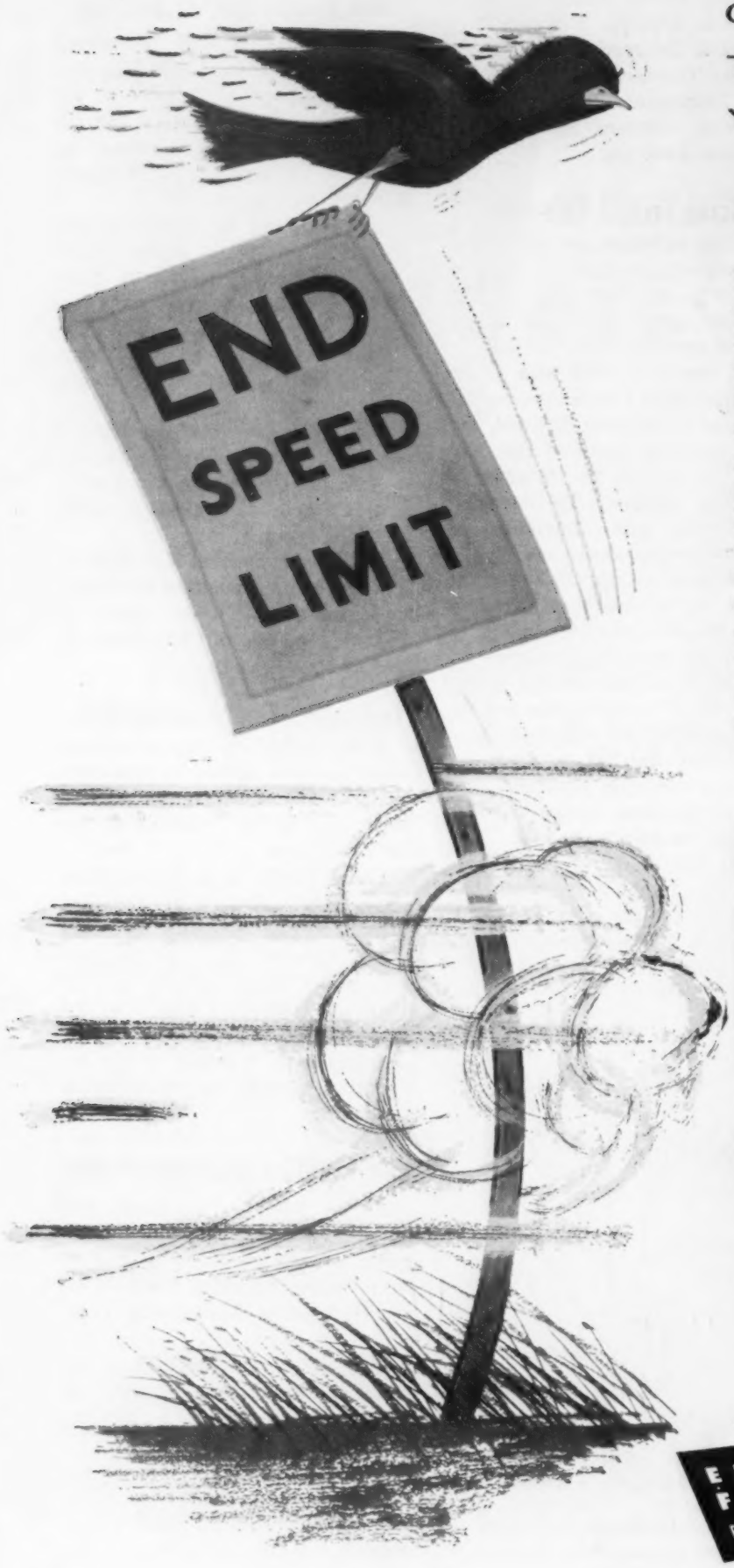
Firms named in a federal civil action filed in Detroit are the Cincinnati Milling Machine Co., Cincinnati Grinders Inc., and Kearney & Trecker Corp. Within a few hours after the suit was filed, the firms agreed to enter into a consent judgment, terminating the restraints alleged in the government's complaint.

Gain 1 Million Households Yearly

Market potential for tools, fixtures, and other consumer hard goods usually required in households is expanding at the rate of 1 million new households each year.

Latest U. S. Census Bureau reports place the total number of households in the U. S. at 46,828,000 as of April.

A feature of the growth is an increase in the proportion of older age groups owning their own homes.



GET ALL THE OUTPUT THAT'S BUILT INTO YOUR MACHINES...USE

ANTISEP

You can easily prove that Antisep heavy-duty cutting fluid keeps up with the speed of your modern equipment . . . just try it!

Today's machines and modern tooling are made to give you increased metal-cutting capacity and more profitable operation.

So is Antisep . . . the heavy-duty water-soluble base that lubricates better and takes heat away faster than any cutting oil you can match against it. It has excellent anti-welding properties as well—and no objectionable odor.

Take the speed limit off your machines by using Antisep. Call the Houghton Man . . . or write to E. F. Houghton & Co., 303 W. Lehigh Avenue, Philadelphia 33, Pa. . . . for a trial production run.

NO SPEED LIMIT HERE!

An Ohio manufacturer increased production substantially by changing to Antisep, machining collets of Hy-Ten steel (M temper) at 85 SFM—which was considerably higher than the speed he formerly regarded as top—and obtained improved finish as well.

ANTISEP

THE HEAVY-DUTY, WATER-SOLUBLE

CUTTING BASE

. . . a product of

E. F. HOUGHTON & CO.

PHILADELPHIA · CHICAGO · DETROIT · SAN FRANCISCO

Ready to give you on-the-job service . . .

Need Automation to Fill Electronic Need

GE spokesman says conventional production techniques insufficient to meet demand for electronic equipment . . . Steelworkers walk out at Kaiser—By T. M. Rohan.

Air Force and industry agree on the need for more electronic equipment and last week in San Francisco talked up automation as the answer.

At the second symposium of its type in the U. S. sponsored by Stanford Research and the Air Force, Brig. Gen. T. C. Rives (U.S.A.F. ret.) of General Electric put the problem this way:

"Every company in the U. S. expects that next year it will be able to order off the shelf 10,000 or more tubes for machines which will replace all of its clerical personnel and give management much more quickly, complete information for management control.

"Gentlemen, believe me, conventional production techniques cannot provide these units which the industrial and domestic public are demanding. For military use in time of emergency there will not be enough people in the Free World to take care of electronic production for use in another war."

Want Facts . . . Over 400 officials of top U. S. firms were eager to know principally: (1) Whether it's worth investing in automatic equipment; (2) how far to jump in; (3) theory and precise details on setting up various operations; and (4) will it work?

Most pertinent advice was:

(1) Adopt automation gradually with existing manufacturing steps on an operation-by-operation basis.

(2) Use standard components from existing suppliers with as little modification as possible.

(3) Stockpiling for national emergency appears out of the question due to rapidly changing designs and high costs.

Kaiser Walkout . . . CIO steelworkers at Kaiser Steel Co. last week picked a customer-tour day for an unauthorized walkout which shut down the mill completely by nightfall.

By the time 150 customers, flown from Northern California in a chartered Super Constellation and two DC6-B's arrived late in the day from a preliminary tour of the Eagle Mountain ore mine, the mill was closed.

At week's end, Kaiser and union officials were in continuous session attempting to straighten out the mess. No mill damage was reported.

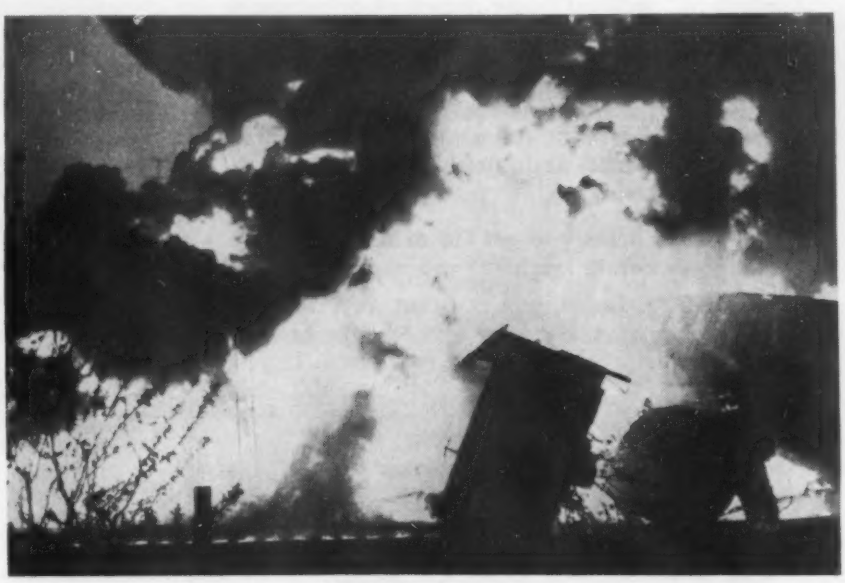
Walkout started over refusal of four powerhouse mechanics to do work assigned them which they considered to be a rigging job. Portions of the contract signed less than a month ago by union head David J. McDonald and Henry J. Kaiser, and within the week by local officials, provide no negotiations while a work stoppage is in effect.

First Presses Ready . . . The Pacific Northwest's first major aluminum extrusion presses are expected to be in operation by late June or early July at Alcoa's Vancouver, Wash., mill.

The two 2500-ton presses nearing completion in a $3.5 million fabrication expansion will use direct-chilled ingots now being supplied principally to Alcoa's Vernon, Calif., plant from new casting machines.

Close Rheem Deal . . . Rheem Mfg. Co., Richmond, Calif., last week closed a deal which puts the firm in the auto component business. Entry was accomplished through stock exchange with U. S. Spring and Bumper Co., Los Angeles.

A Rheem official indicated fabrication of some springs, bumpers and other products may be transferred to other Rheem plants from the present crowded U. S. Spring and Bumper plant.



GASOLINE-FILLED tank car burst into flames and was destroyed last week at Antioch, Calif. The car along with six others of a Southern Pacific freight train went off the rails causing the fire.

Don't wait...Investigate the

Kearney & Trecker

TOOL-LEASE

PROGRAM

Here's a common sense approach to your plant modernization program

It's the most significant opportunity ever offered users of milling machines and precision boring machines

In these times, modernization is the soundest approach to meeting increasingly competitive conditions. And the best way to modernize — to improve products, cut costs, gain productive flexibility — is to retool with new machines. Today, Kearney & Trecker's new Tool-Lease Program offers you an unmatched opportunity to "junk the clunkers" that are nibbling away at your profits. It's time to act. Don't wait — investigate!

These are only a few of the advantages Tool-Lease offers you

You can try out new machines in your own plant . . . without being obligated to purchase them. You can get hitherto impossible flexibility and capacity to take advantage of changing production requirements without risk of obsolescence. Last, but not least, you can expand production without tying up working capital, going into debt, or impairing future borrowing capacity.

Tool-Lease helps you get the exact milling or boring machines you need

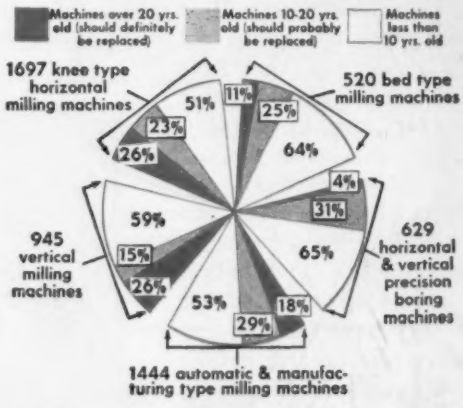
Under Tool-Lease, you can rent any Kearney & Trecker standard knee or bed type milling machine or precision boring machines. If you require special machinery or heavy-duty CSM bed-types, special agreements will be considered.

Three basic plans give you varying options to continue or terminate the lease or purchase the equipment.

For complete details on Tool-Lease . . . help in analyzing your milling and precision boring needs — see your Kearney & Trecker representative or mail coupon to Kearney & Trecker Corp., 6784 W. National Ave., Milwaukee 14, Wis.

THE CRITICAL PICTURE OF CREEPING OBSOLESCENCE . . . AND HOW TO STOP IT!

Let's take a typical basic industry as an example — Agricultural equipment. Of the 5235 standard knee type horizontal, vertical, bed and manufacturing milling machines and precision boring machines in use today—*which could be replaced by Tool-Lease equipment* — 26% are 10-20 years old, 19.9% are more than 20 years old.



TOOL LEASE
KEARNEY & TRECKER
MILWAUKEE
MACHINE TOOLS
EQUIPMENT ®

Kearney & Trecker Corporation
6784 W. National Ave., Milwaukee 14, Wis.

Please send me Bulletin TL-10A with details on the Tool-Lease Program. ☐ Check here if you would like to have a representative call on you as soon as possible (or call Milwaukee, GReenfield 6-8300).

Name.....

Title.....

Company.....

Address.....

City.....Zone.....State.....

Depreciation Policy Drag on Aircraft

Unrealistic depreciation schedules hurt quality, efficiency of aircraft output . . . Manufacturers must use government-owned World War II tools—*By E. J. Egan, Jr.*

One of the aircraft industry's major problems is to keep production moving at the same pace as design. Roy T. Hurley, Curtiss-Wright Corp. president, pointed this out in an address at the recent SAE Aeronautic Production Forum in New York.

Design of aircraft and components has always moved swiftly, Mr. Hurley asserted. But the necessary tools to combine production efficiency with quality and economy have lagged far behind.

Mr. Hurley said the major reasons for this wide gap between design and production progress were: (1) Use of obsolete government-owned equipment in aircraft plants, and (2) unrealistic depreciation schedules that currently apply to privately owned machine tools.

Use Old Tools . . . An estimated 60 to 65 pct of machine tools in aircraft plants are U. S. property, as are many of the 6800 tools presently used by Curtiss-Wright, Mr. Hurley stated. Approximately 5300 of these tools were acquired in the early stages of World War II and have been rebuilt at least once.

This older equipment was designed to produce reciprocating engines and is not necessarily the best for jet engine production. But the industry has to "make do" with this government-owned equipment. Bulk of the aircraft manufacturers' business is military aircraft, and Air Force appropriations are rarely large enough to cover new tooling for major production programs.

In a field where new designs and developments come so rapidly, heavy chunks of military appropriations must go into prototype programs, so the World War II machine tools are tuned up again to do the best they can.

Wants to Buy . . . Curtiss-Wright would prefer to buy its own equipment for military and civilian production and keep up to date with replacement tools as newer, better models become available, Mr. Hurley said. But present tax laws make new equipment purchases prohibitive.

The industry must currently depreciate its machine tools over a 12-year period, on the average. But equipment usually becomes obsolete in a much shorter time. Wear and tear is part of the reason, but new materials and new designs of aircraft and components are the main factors.

Needs Change Fast . . . A recent Curtiss-Wright study shows the inadequacy of the overage machine tools now in use. Mr. Hurley said that if his company could retool completely right now, it could only determine the machine tool types that might meet job requirements for the next 3 years.

"Oh, sure I get tired of it, but it's the only thing I know."

For the next 5 years, guesses as to equipment needed would only be "fairly accurate." Beyond that point, the specific machine tools needed could not be predicted; estimates would have to be in terms of dollars for "X" types of production units.

Would Spend More . . . Curtiss-Wright should be spending $10 million annually for new machine tools, Mr. Hurley declared. And it would, he said, if equipment could be depreciated at a rate corresponding to its obsolescence.

He also advocated further liberalization of accelerated depreciation provisions in the pending new omnibus tax bill.

Automate Aircraft . . . Mr. Hurley said automation is becoming necessary to his industry as it is to others. But in aircraft engine manufacture, the concept is best applied to single machine tools.

Because of frequent design changes, continuous work handling through integrated machine tools would not be too practical, Mr. Hurley indicated. But with automatic handling fixtures applied to individual machine tools, product revisions would only require new or modified jigs.

Use Cobalt . . . Referring to the industry's work with new materials, Mr. Hurley said his company is making limited use of cobalt and columbium. Titanium is being employed in increasing quantities; in some cases because of its own superior properties; in others to beat the nickel shortage.

Curtiss-Wright is not particularly concerned about uniformity of titanium analysis. At present the company buys from six different sources, uses the metal successfully.

The Iron Age

SALUTES

Lee Wilson

An inquiring mind, sparked by competition, brought success in business, hobbies and the Navy.

AT one point in his varied career, Lee Wilson, president of Lee Wilson Engineering Co., Cleveland, was installing industrial gas burners in Pittsburgh steel mills. The waste and inefficiency of accepted annealing methods irritated him to the extent of becoming a personal challenge. Characteristically, the Cleveland industrialist did something about it.

He invented radiant tubes for annealing sheet, strip steel and wire products. This invention revolutionized these processes and over the years has saved millions in annealing and pickling costs. After solving the problem, Lee Wilson wasn't content to rest on his laurels. He started his own business in one room of his home with his wife as the firm's secretary and lone employee.

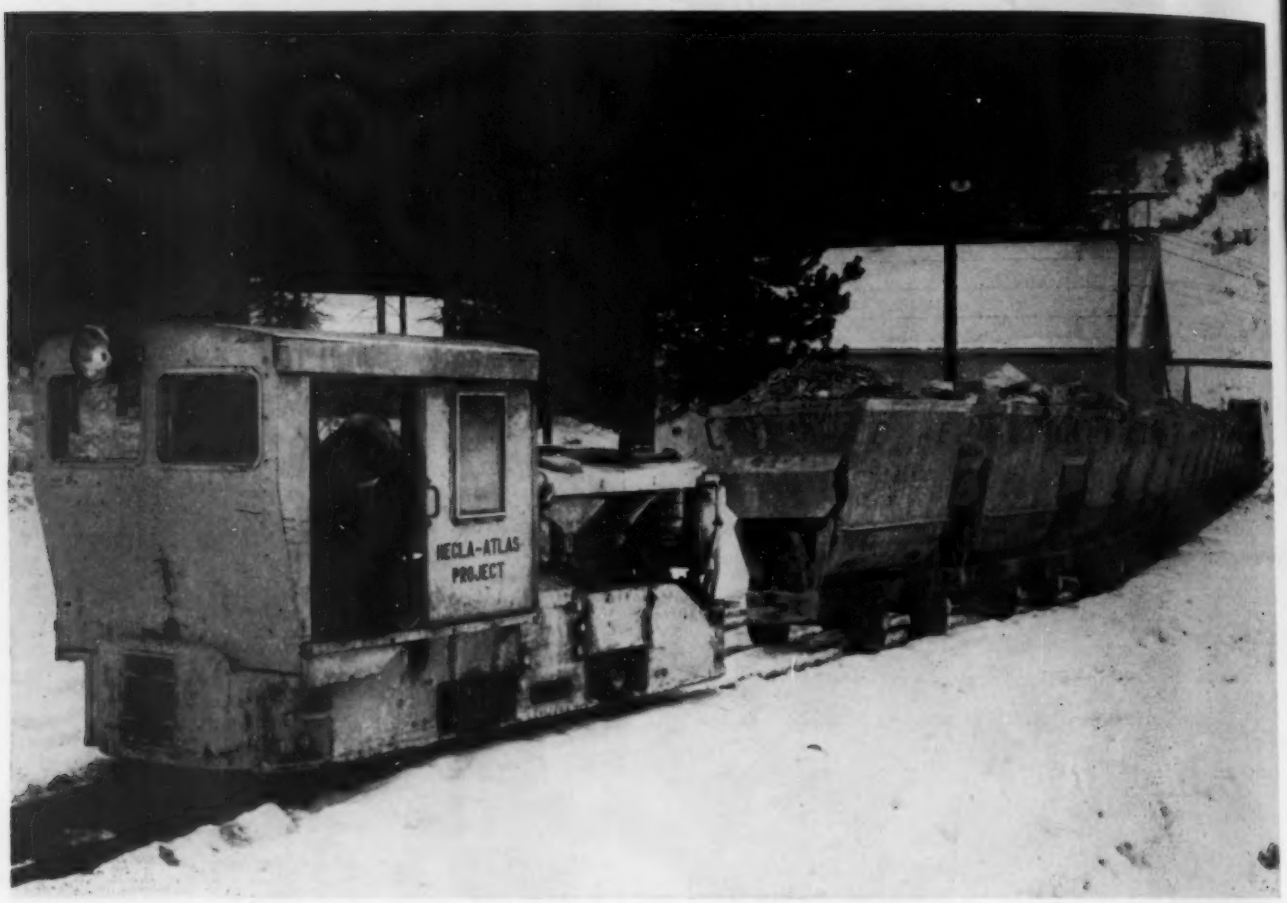
Since then Lee has started and continues to manage a half dozen enterprises, all related to steel fabrication or heat treatment of metals. He credits stiff competition for spurring his achievements in the industrial heating field.

Lee Wilson learned how to meet competition early in life while working in Northwest lumber mills to get through high school and Oregon State College.

In addition to his career in metalworking, Lee has spent time in Alaska selling machinery and served for two years as a Commander with the Seabees in the Pacific. He's also found time to qualify for a pilot's license.

When he isn't at home with daughter Nancy Lee and Mrs. Wilson, Lee can usually be found working on his 40-ft sailboat *Cotton Blossom*.

THIS PLYMOUTH...



OPERATES AT 96% EFFICIENCY!

This 5-ton Plymouth Diesel locomotive operates a minimum of 150 hours a month, with only 6 hours out for routine maintenance and repairs! That's 96% efficiency!

It is used for rugged hauling, underground, by the Hecla Mining Company, Wallace, Ia., on their Hecla-Atlas Project at Mullan, Ia. Operating on 24" track, this 5-ton "powerhouse on wheels" hauls as many as 18 loaded cars at a time.

It will pay you to power your hauling operations with a Plymouth and benefit from reduced down-time, lower fuel costs, greater efficiency. 3 to 70 ton sizes—Gasoline, Diesel, Diesel-Electric—narrow and standard gauge models. Torqomotive Drive offered on most models. Write for catalog.

Plymouth Locomotive Works, Division of
The Fate-Root-Heath Company, Dept. A-2,
Plymouth, Ohio

PLYMOUTH®
TORQOMOTIVES

The Iron Age

INTRODUCES

Ralph S. Penn, appointed president, PENN CONTROLS, INC., Goshen, Ind.

Fred L. Wagner, becomes vice-president, Sales, Eastern and Southern Region, UNIVERSAL ATLAS CEMENT CO., New York; and Louis V. Walsh, becomes sales manager, Pittsburgh territory. Mr. Wagner succeeds Albert O. Stark, who is retiring May 1.

C. W. Springer, elected vice-president-Eastern sales, GRAVER TANK & MFG. CO.; J. E. Fogarty, named vice-president and general manager, Mid-Continent Div.; and W. T. Hudson, made vice-president and manager, Rocky Mountain & West Coast Divisions.

Edward J. Giblin, appointed assistant secretary, EX-CELL-O CORP., Detroit.

H. J. Readle, named vice-president, GATE CITY STEEL WORKS, INC.

F. G. Koenig, Jr., elected executive vice-president, ALABAMA-BY-PRODUCTS CORP.; and J. Elbert Johnson, becomes vice-president and treasurer.

Raymond F. Evans, elected chairman, DIAMOND ALKALI CO.; and John A. Sargent, elected president.

George E. Whitlock, named chairman of the board, MULLINS MFG. CORP., Warren, Ohio; and Harry M. Heckathorn, becomes president.

Dr. Joseph J. Wylegala, Dr. Emil J. Geering, and Dr. Paul E. Hoch, have been assigned to the Research & Development Dept., HOOKER ELECTROCHEMICAL CO.

James M. Helme, appointed director of industrial relations, JOSEPH T. RYERSON & SON, INC., Chicago.

B. W. Kinderman, named comptroller, Cleveland Welding Co., subsidiary of AMERICAN MACHINE & FOUNDRY CO.

J. J. Smith, appointed sales engineer, THE HYDRAULIC PRESS MFG. CO., Mt. Gilead, Ohio; Joseph H. Ondras, appointed sales engineer; and Kenneth V. Keidel, appointed sales engineer.

Richard G. Jones, elected to the board of directors, HANDY & HARMAN; and Frank H. Wemple, elected treasurer.

John D. Humphreys promoted to assistant chief engineer, CINCINNATI LATHE & TOOL CO., Oakley, Cincinnati.

Leon Marmon, appointed sales engineer, THE PARKER APPLIANCE CO., Cleveland area.

Paul C. Hurley, becomes manager of advertising, PENNSYLVANIA SALT MFG. CO.; E. S. Garverich, becomes technical director; and Richard O. White, named production manager.

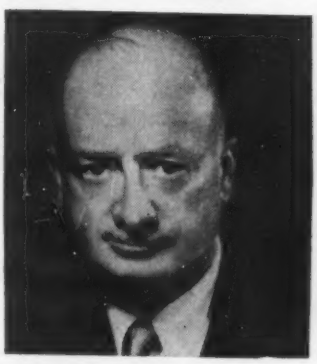
Paul E. LaFrance, appointed manager, Los Angeles office, THE BALDWIN-LIMA-HAMILTON CORP.

Richard G. Hass, appointed resident manager, Verona, Pa., plant THE INGALLS IRON WORKS CO., Birmingham, Ala.

Herman A. Gledhill, appointed general manager, HEPPENSTALL CO., Pittsburgh.

FREDERICK W. McINTYRE, JR., appointed president, Reed-Prentice Corp., Worcester.

PAUL K. ROGERS, JR., becomes president, Skinner Chuck Co., and Skinner Valve Div.



WILLIAM J. WELCH, elected a vice-president, National Lead Co., New York.

Personnel

T. E. Aughinbaugh, promoted to assistant manager of sales, Southern region, Motor Truck Div., INTERNATIONAL HARVESTER CO.

Robert Shoenhair, named assistant manager, Washington, D. C., AIRESEARCH MFG. CO., a division of The Garrett Corp.

Allen B. Crowley, named assistant manager, Birmingham district, HERCULES POWDER CO.

Hugh T. Price, Jr., made factory manager, Grinding Machine Div., NORTON CO., Worcester; **Roland T. Nelson**, becomes production manager; and **Oscar A. Erickson**, becomes planning engineer.

William F. Wilson, appointed works manager, THE GEAR GRINDING MACHINE CO., Detroit.

Howard A. Nelson, appointed administrative assistant to the sales manager, Machine & Small Tool Divisions, BARBER-COLMAN CO., Rockford, Ill.

Paul S. Landis, appointed an assistant manager, Sheet & Strip Products, JONES & LAUGHLIN STEEL CORP., Pittsburgh; **L. T. Willison**, is manager, sheet and strip products and **Ralph Miller** also is an assistant manager.

Richard F. Coe, appointed advertising manager, THE TAFT-PIERCE MFG. CO., Woonsocket, R. I.

Warren C. Dunn, appointed supervisor of product sales, General Sales Dept., Union Switch & Signal, Division of WESTINGHOUSE AIR BRAKE CO.

Lawrence D. Toolan, appointed sales manager, Forging Div., Catasauqua, Pa., PHOENIX MFG. CO.

Clemens A. Tarter, appointed assistant superintendent of cold reduction, in the tin plate mill, KAISER STEEL CORP., Fontana, Calif.

Albert James, appointed general sales manager, FERRO POWDERED METALS, INC., Salem, Ind.

CHARLES D. SCRIBNER, named vice-president of industrial relations, Packard Motor Car Co., Detroit.

J. W. McMULLEN, named vice-president-transformer and switchgear equipment, Allis-Chalmers Mfg. Co., Milwaukee.

PHILIP GLICK, appointed corporate secretary, The Eastern Brass & Copper Co., New York.

WALTON W. HOFMANN, appointed chief engineer of construction, Bethlehem Pacific Coast Steel Corp., Steel Div.

The expert's materials work with him!

Superior skill lies behind the wizardry of the fly rod expert. But, he pays very close attention to the materials from which his rods, reels, lines, and flies are made. He is very exacting in his specification of materials that will provide the precise balances, weights, and flexibility his art requires.

The fly rod expert makes sure that his materials are working *for* him and *with* him.

Add this Spec to Your Blueprints

Memorandum

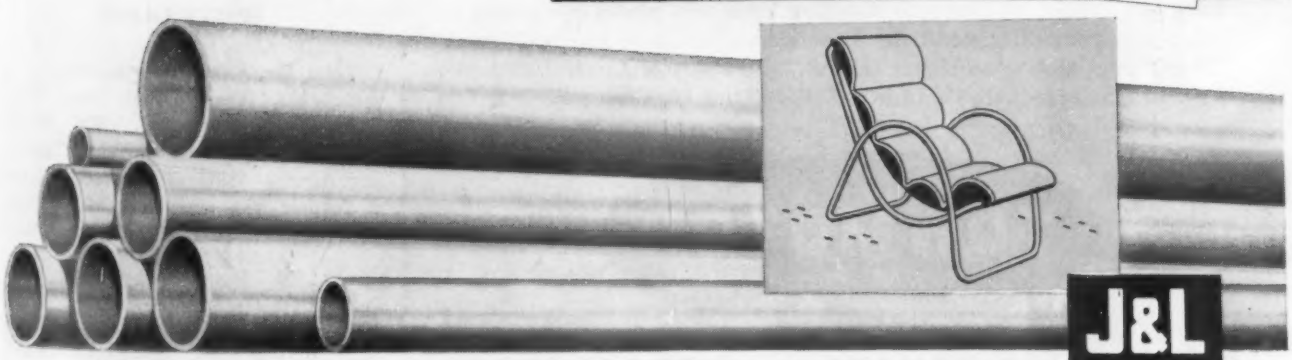
You can depend upon J&L ELECTRICWELD TUBING . . . it works *for* you and *with* you! It's made from J&L steel of carefully controlled quality.

You can depend upon J&L Electricweld Tubing for:

1. Uniform wall thickness (easy forming)
2. Strength (comparable in strength to heavier sections)
3. Ductility (easier, faster fabrication)
4. Reductions in weight (less weight in proportion to strength)
5. Smooth surface (ideal base for electro-plating, enameling, and painting)
6. Ready joining (by mechanical or welding methods)
7. Lower costs (savings in material and overall production costs)

**All standard lengths . . . diameters . . . wall thicknesses for tubular furniture*

WHEN YOU NEED TECHNICAL ASSISTANCE . . . call J&L. Our metallurgists can investigate your problem and suggest helpful applications of Electricweld Tubing.



Jones & Laughlin
STEEL CORPORATION — *Pittsburgh*

J&L STEEL

—Personnel—

H. E. McConahay, named superintendent, Material Control Section, ALLIS-CHALMERS MFG. CO., Milwaukee; **L. E. Worley,** becomes superintendent, scheduling section; and **J. E. Brinkmann,** becomes assistant superintendent, scheduling section.

P. H. Luckett, named sales manager, Macnick (Instrument) Div., Tulsa, Okla., ROCKWELL MFG. CO.

George V. Dutney, appointed special assistant to the president, NORDBERG MFG. CO., Milwaukee.

Donald A. Sommer, promoted to assistant sales manager, Industrial Div., KEYSTONE STEEL & WIRE CO.

Joseph E. Bisese, named sales representative, Follansbee Metals, a division of FOLLANSBEE STEEL CORP., Pittsburgh.

E. H. Stau, appointed western division sales manager, Los Angeles, Calif., TOWNSEND CO.

Raymond J. Contrucci, named sales representative, Detroit, Carboloy Dept., GENERAL ELECTRIC CO.

R. C. Angell, appointed supervisor, Allspeed Sales, Oil City Works, WORTHINGTON OIL CITY WORKS.

Norbert F. Eichelsbacher, promoted to general manager, TRION, INC., McKees Rocks, Pa.

Frank J. O'Brien, Jr., appointed general sales manager, METAL & THERMIT CORP., New York.

OBITUARIES

John MacAulay Brown, director of purchases, Veeder-Root Inc., Hartford, Conn., recently. Mr. Brown was a past president of the Purchasing Agents Assn. of Connecticut, and a former vice-president of the National Assn. of Purchasing Agents.

Charles W. Staacke, 56, outstanding authority on conveyor belt design, construction and installation, suddenly. He was technical adviser on conveyor and belting sales for Hewitt-Robins, Inc., Stamford, Conn.

The Iron Age
FOUNDED 1855
Technical Articles

Basic Lined Cupola Cuts Costs, Improves Quality

By T. M. Frazell
Metallurgist

J. D. Sheley
Asst. Plant Manager

The Black Clawson Co.
Hamilton, Ohio

◆ Inherent advantages of the basic lined cupola have attracted attention of cost-conscious foundrymen . . . Use is growing . . . Lining life is increased and less refractory per ton of metal melted is used.

◆ Cheaper grades of pig iron and coke may be used . . . When scrap iron and pig are in short supply, an all-steel mix may be substituted . . . Lower sulfur contents at the spout are possible with basic slags . . . High manganese recovery is possible.

◆ FOUNDRYMEN are showing increased interest in use of basic lined cupolas because of the potential economies and improved product quality possible with this refractory. Cheaper grades of pig iron and coke may be used. An all-steel mix may be substituted when scrap iron and pig are in short supply. Lower sulfur contents and higher manganese recovery are possible.

The Black-Clawson Co., Hamilton, Ohio, after trying both acid and basic melting standardized on the basic practice. Lining life has increased and less refractory per ton of metal melted is used. Low sulfur features are especially desirable in producing ductile iron. This company's practice requires relatively short heats for production of gray and ductile iron grades from the same heat and techniques here may not be applicable elsewhere.

Two cupolas are used. One cupola is made ready for the day's heat, including sand bottom preparation, lighting off, and preliminary charging, while the cupola used the previous day is chipped out, repaired and the lining patched. Heats range from 2 to 5 hours. Six men run the entire operation.

Both cupolas, Whiting No. 8's with a 78-in. OD lined to 60-in. ID, are operated on continuous-tap with front-slagging. Metal, flux and coke charges are carefully weighed. Each metal charge weighs 1500 lb. The cupola is tapped 20 min after the blast is turned on and slagging time is generally 20 min later. The centrifugal blower delivers 6300 to 6500 cfm at 18 to 22 oz windbox pressure. Although tapping temperatures depend on factors such as type of coke and blast volume, metal temperatures at the spout vary from 2780° to 2880°F. Melting rate has averaged 10.7 tons per hr.

A layer of 2-in. insulating firebrick next to the cupola shell, extends from the base ring to a height of 10 ft. Above this 1-in. firebrick is used to the

". . . Most important factor in erosion of basic refractories is silica in the charge . . ."

charging door. The basic lining in the well and melting zone is made up of unburned magnesite-chrome key-blocks, 3 in. high x 6 in. front to back, laid up 52 blocks to a circle. A corrugated cardboard strip in every eighth joint takes up expansion when hot. A magnesia-base high temperature mortar is used throughout.

These key-blocks extend upward from the base ring for 120 in. The lining from that point to the top of the stack is made up of acid cupola blocks 4 in. high, 26 blocks to a course. Basic refractories are necessary only in those portions of the lining that directly contact or contribute to the slag.

Patching material is a monolithic granular refractory, grain fineness about 35, of dead-burned dolomite, stable dead-burned high-magnesia clinker, and chemical bonds. This is applied through a pneumatic refractory gun which automatically adds the proper amount of water and applies the refractory to the cupola wall under 12 to 15 psi pressure.

Magnesite brick works well

The coarser-grained "rebound" material which does not stick to the wall is caught on a tarpaulin and used again after being mixed with 30 pct new materials. The first application of this material on a newly lined cupola will be only about 1 in. thick. As the lining burns back the daily patch grows thicker, stabilizing at 2 to 3 in. This patch is applied only in the well and melting zone. Time involved in chipping out the old lining, patching and repairing the well averages 1½ to 2 hours.

Unburned magnesite brick used at present has given excellent service. Some 131 heats were obtained from one lining with a minimum of repair other than daily patching. This is about twice as many as obtained previously on acid lining. A cupola is seldom out of operation more than 2 days; a complete lining has been installed in as little as 80 manhours.

The most important factor contributing to erosion of basic refractories is the amount of silica entering with the charge. Although some silica is present as silicon in the metal charge, greatest amount enters as adhering sand on foundry returns. Foundry returns should be cleaned as thoroughly as possible; this is accomplished by hydroblasting. A great deal of trouble was encountered with rear slagging, because of erosion of the basic slag and the oxidizing action of the blast. After trying many materials without success, front slagging proved to be the answer.

Keep dam height constant

In the breast and runner box a neutral Missouri fireclay-graphite mixture, called Helspot, successfully resists the erosive action of slag and metal. Life of a breast is 2 to 5 heats, depending on heat size. The taphole, 1 3/16 in. starting diam, erodes to about 1¾ in. A 2-in. layer of Helspot is rammed over the firebrick slabs which line the runner box. The slag skimmer, slag notch, dam and tilting spout are formed of unburned magnesite bricks covered with a layer of Helspot. Life of a runner box is 15 to 20 heats, and daily patching is confined to the rammed layer.

It is important to keep the dam at as nearly constant height as possible during the heat. A jig in the tap hole and runner box aids in gaging dam height and position of the slag notch. Dam height is a controlling factor in successful operation of a front slagging basic cupola since the metal height in the runner box controls the height of the slag blanket in the well.

A reduction in dam height, with a consequent reduction of slag volume, decreases the time of contact between slag and coke. This increases the iron oxide content of the slag and reduces its desulfurization power. The lower lip of the slag notch should always be at least 1¼ in. above the dam to allow a slag covering on metal in the runner box.

TABLE I

COKE AND FLUX CHARGES

	On Bed		Gray Iron, per Charge		Ductile Iron, per Charge	
	Lb	Pct of Metal Weight	Lb	Pct	Lb	Pct
Coke	5000	.....	200	13.3	200	13.3
Flux: Limestone	120	8.0	60	4.0	90	6.0
Fluorspar	7½	0.5	3¾	0.25	3¾	0.25
Calcium Carbide	15	1.0	7½	0.50	15	1.0

TABLE II

BASIC CUPOLA SLAG COMPOSITIONS

Silica	31.60	29.40	29.30
Alumina	5.38	12.38	11.06
Lime	41.30	37.80	38.10
Magnesia	18.90	17.92	18.80
Ferrous Oxide	.....	0.20	0.44
Ferric Oxide	.....	Trace	Trace
Manganese Oxide	.....	1.03	1.06
Sulfur	0.81	0.74	0.73
Sulfur in Metal	0.069	0.055	0.071
Desulfurization Ratio	11.7	13.0	10.3
Basicity Ratio, Pct	1.90	1.90	1.94

In the original basic installation, six conventional rectangular tuyeres were used. Some difficulty was encountered with bridging and uneven erosion of the lining and the tuyeres occasionally burned out. Tuyeres of cylindrical design were installed, six to a cupola, evenly spaced in a circle. Five are 27 in. above the base ring and one an inch lower to provide a slag overflow in case of trouble. They are aimed on the level toward the center of the cupola and contain a double set of vanes which impart a spiralling action to the air blast. Although the tuyere area-cupola area ratio has been reduced from 1:3 to 1:9½, four improvements have been noted: (1) Metal is uniformily hot throughout the heat; (2) there is less lining erosion; (3) there has been little or no bridging; (4) tuyere replacement has averaged less than two per relining.

Basic slag refines metal

In acid practice, slag must more or less be tolerated. Basic slag, however, can be controlled somewhat and made to refine several elements of the metal. Desulfurization, carbon pickup and a limited dephosphorization depend on slag quality and volume.

In desulfurization the basic slag converts the metallic sulfides which dissolve in the slag but are relatively insoluble in the metal. The desired result is sulfur in the slag. In basic practice it is possible to get a much lower sulfur content at the spout than in the charge. This is an economic necessity in producing ductile iron. Desulfurization, Fig. 1, increases with increasing volumes of higher basicity slags. Carbon pickup is also greater under these conditions.

Dephosphorization is possible but impractical in the basic cupola since it can be accomplished only through loss of metal temperature, oxidation of much or all of the charged silicon, and sacrifice of desulfurization and carburization. With pig irons available today excessive phosphorous content is seldom a problem.

In acid practice, slag adhered to the coke and prevents appreciable carburization. Final metal carbon content depends largely on carbon in the charge. In basic practice the slag cleans the coke allowing the molten iron to dissolve large percentages of carbon.

A 100 pct steel charge can be melted in the basic cupola with a final carbon content above 3 pct. This is an advantage when pig iron or cast scrap are short or when steel scrap price favors use or high-steel mixes. In general, carbon control is easiest at high carbon levels and becomes more difficult as desired carbon content decreases. Control of slag volume and basicity as well as quantity of coke afford some control over carbon pickup.

Coke additions and fluxing practice are shown in Table I. An extra 100-lb coke booster is added every fifth charge. As a rule, no flux is charged on the first two or last charges of a heat, or the last ductile iron charge. When ductile iron is to be made from the first iron tapped from the cupola, calcium carbide in the amount of 3 pct of the metal to be tapped is distributed throughout the bed.

This makes the slag more basic, lowers the ferrous oxide content, has an excellent desulfurizing effect, Fig. 2, and increases tapping temperatures; carbon pickup, however, is high and more difficult to control. The slag occasionally is sticky and difficult to handle for a short

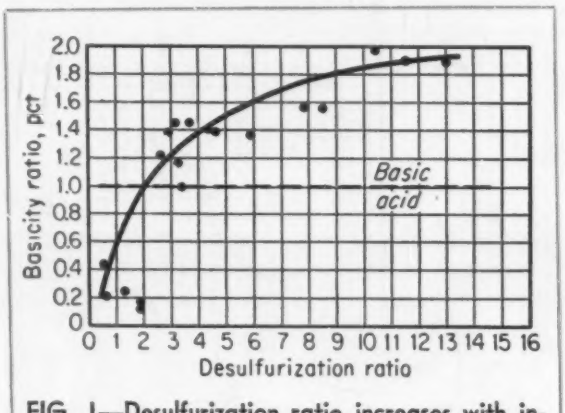


FIG. 1—Desulfurization ratio increases with increasing volumes of higher basicity slags.

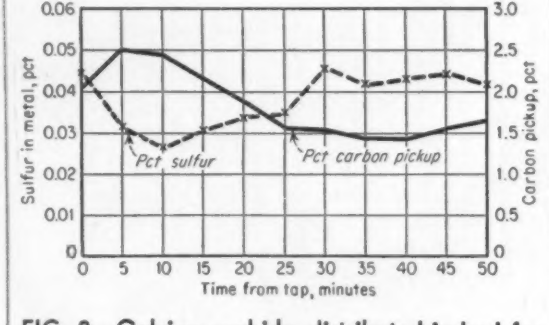


FIG. 2—Calcium carbide, distributed in bed for first iron tapped, makes slag more basic.

TABLE III

ANALYSES OF CHARGED MATERIALS

Pct	Regular Pig Iron	Ductile Pig Iron	Silvery Pig Iron	Foundry Returns*	Steel Scrap
Si	2.50	1.16	15.95	1.56	0.10
S	0.033	0.035	0.020	0.065	0.060
P	0.16	0.029	0.085	0.077	0.040
Mn	0.90	0.23	0.85	0.51	0.60
Tc	4.00	4.25	0.80	3.10	0.50

* Average for all gray iron returns.

Slag composition is important. Color and lustre of slag pancakes indicate basicity.

time after slagging begins and it shows a severe cutting action on the taphole and runner box. This method, however, has been used successfully where occasion demanded extremely low sulfurs early in the heat.

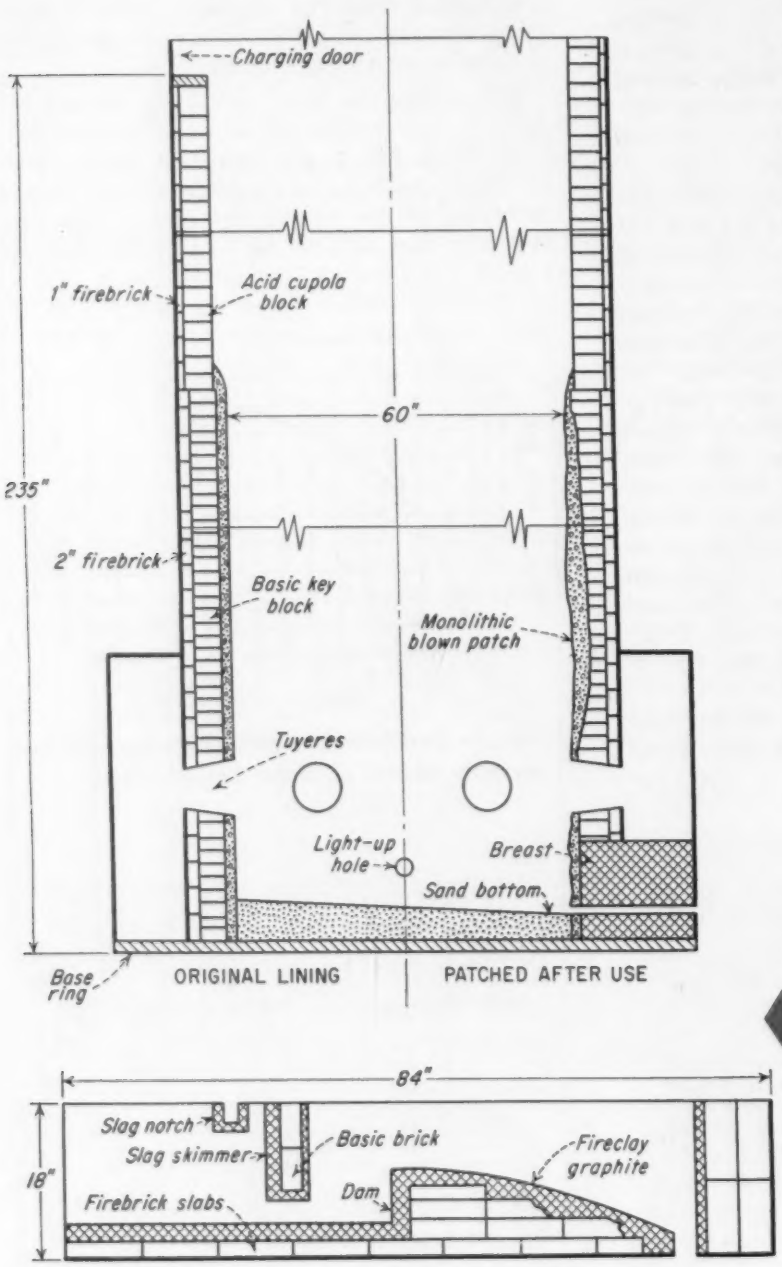
Limestone used is 85 pct calcium carbonate, 13 pct magnesium carbonate, with silica, iron and iron aluminate combined forming less than 1 pct.

High lime and low silica contents of this flux make it desirable for basic practice. Higher basicity operation is possible with less attack on the lining; however, silicon loss is more noticeable. In some cases this loss has approached 35 pct of charged silicon; the average with the above flux is from 20 to 25 pct which is out-of-line for basic practice. Fluorspar in briquette form is used to improve slag fluidity.

Some manganese is oxidized in the basic cupola but the oxide formed has only limited solubility in basic slag; a loss of about 10 pct is considered average. No manganese additions are made. Low sulfur eliminates the problem of manganese-sulfur balance.

Slag is sampled at intervals during a heat. Typical samples, Table II, are taken from the continuous slag stream in a cast iron ladle 3 in. in diam x 1 in. deep. Color and lustre of the slag pancakes indicate slag basicity and ferrous oxide content. Operation at a mildly basic level is indicated by a dull lustre and a dark gray to black color on the upper surface of the pancake. An increase in basicity and a decrease in ferrous oxide are indicated when the surface tends toward a dull brown and the fracture becomes granular and somewhat porous, especially in the upper portions. A black slag with a shiny surface warns that ferrous oxide content has increased and basicity ratio has dropped below 1.0. Increased limestone is necessary to regain the effects of basic melting.

Four classes of iron, Table III, are melted. These are supplemented by alloying to obtain desired metallurgical and physical properties. These include: (1) a high carbon, high silicon, medium strength grade; (2) a low carbon, low silicon iron; (3) ductile or spheroidal graphite iron; and (4) a regular grade suitably alloyed to obtain higher strengths, densities, or corrosion and erosion-resistance.



CROSS-SECTION showing cupola and dam construction. Lining is applied only on areas where reaction occurs. Front slagging gave best results in this operation.

Nondestructive testing—

Electronic Units Make Fast Check on Part Quality

By D. Eldred
Guided Missiles Dept.
General Electric Co.
Schenectady, N. Y.

◆ Comparative checks on chemical composition, hardness, case depth, plating thickness are quickly made with portable electronic units . . . Parts tested are checked against a standard specimen for any variations in electrical or magnetic properties . . . Degree of these variations can be correlated with the physical or chemical property being tested.

◆ This article describes two instruments developed for this type of testing . . . Both can be used on ferrous and nonferrous material but one is more accurate over a wider range . . . Flaw detection is a by-product of the basic tests . . . Cracks and internal voids cause instrument deviations in apparently similar and sound parts.

◆ TO CONSERVE METALS and reduce manufacturing costs, portable electronic comparators are being used to check variations in chemical and physical properties of metal parts. These nondestructive test methods can often be recommended for separating mixed metals, measuring hardness, indicating case depth or plating thickness, and detecting surface flaws.

Two basic test instruments have been developed at the General Electric Co., Schenectady, N. Y. Both units compare electrical or magnetic properties of test pieces with a known standard. Variations of these properties from the standard can be used to measure corresponding variations in chemical or physical characteristics.

In principle, when a simple air coil is energized by an alternating current, its impedance is influenced by the presence of any metals placed within it. This is due to the inductive reactance set up by different grades and types of metals. By measuring the change of impedance in the test coil, the metal grade can be indicated by comparison with a known reference standard. These measurement readings can

METALS comparator measures relative hardness of lathe bedways compared with a standard.

Shape of the test part must be the same as the standard when checking hardness . . . Only one variable at a time should affect reading.

then indicate the physical properties of the metal when a reference standard of known physical properties is used.

This principle can be extended to other applications by using a range of frequencies for energizing the specimen and amplifying the difference in readings between the reference standard and the unknown.

One of the GE instruments, a metals comparator, consists of an electronic unit in a steel cabinet plus a plug-in test unit. The test unit may be either an air coil or a special test head, or both. When the coil is used as a measuring device, parts are usually inserted in the center of the coil. The test head is used when the part is too large for the coil or when a test is to be made over a limited area.

Amplifies small variations

Basically, the circuit is a balancing network with test frequencies to 10,000 cycles per second supplied by the variable frequency oscillator. The test head or test coil is in one leg of the circuit; several adjusting balancing resistors form the other leg.

Unbalance of the circuit is amplified and then connected to a microammeter which indicates the amount of unbalance. A sensitivity control is provided in the amplifier stage. With a suitable amplifier, sufficient gain is obtained so that extremely small differences in electrical or magnetic properties can be compared.

The other instrument is a magnetic comparator, similar to the metals comparator except that it works only on 60-cycle current. It is a simple bridge circuit with no amplifier or variable frequency control. The instrument is largely limited to ferrous metals and is not as sensitive as the metals comparator. The magnetic unit uses a pair of test coils or test heads.

MAGNETIC comparator checks specimens in test coil (right) against standard in coil at left.

With this comparator, rods, bolts, springs and small fabricated parts are matched with a preselected standard of the same size and shape. Differences are determined in composition, heat treatment or other characteristics which might alter the magnetic properties. By selecting and using only those parts whose properties are within allowable limits, close quality control can be maintained. In some instances, this comparator can distinguish between steels having a Rockwell hardness differential of as little as 2 points.

Match size and scope

When the two test coils are used, an acceptable part is placed in each of them and the circuit balanced to give a zero reading on the indicator. One of the acceptable parts is then removed and the remaining test parts are placed in the coil one at a time. Deflection of the instrument from zero is an indication of magnetic characteristic differences as affected by composition, heat treatment, or other factors. No deflection indicates that the properties are the same as those of the standard.

It is important to have only one variable at a time affecting the reading of the metal or magnetic comparator. When measuring or comparing hardness, the shape of the test part must be identical with that of the standard (within manufacturing tolerances). The test sample should be inserted in the coil in a manner identical with that of the standard; material composition should be consistent, and there should be no large flaws or fissures within the part. The coil should be just large enough to surround the part. Where possible, shape and size of the coil should approximate that of the test part.

Sorts mixed metals

Stock material in the form of rod, wire, strip, or various shapes often become mixed. This frequently happens with such small parts as bolts and nuts, screws, laminations, etc. But in sorting mixed parts only one type of part is checked at a time.

In sorting mixed rod material the test coil is slipped over the end of a standard rod which has been identified by a chemical test. The equipment is balanced so that the indicator

reads in the middle of the dial. The coil is then slipped over the unidentified rods a few feet from the end. Motion of the dial indicator shows whether the material has the same magnetic property as the standard. Care should be taken that only one variable at a time enters the comparison.

The equipment should be operated at the lowest sensitivity ranges for greater stability. With many factory installations, line voltage may vary considerably, and it is desirable to use constant voltage transformers to supply the equipment.

Serves as flaw detector

As originally designed, the metals and magnetic comparators were not intended for fault detection. But they can be used for this purpose under certain circumstances. Where hardness, composition and other factors are constant, flaws will cause a change in the magnetic property of the test part. In a simple casting, which should be solid metal, it is quite possible to detect small fissures and holes with the test units. Open seams in welded tubing have been detected, as well as internal defects in magnetic wire.

Checking for fine cracks in roller bearings is a typical fault detection application. A roller bearing known to have no fault is used as a standard. A powdered carbon test, which takes considerable time, will show flaws occurring as fine cracks in these bearings. But in contrast to this slow method, defective and acceptable bearings can be separated quickly with the metals comparator.

Measures spot hardness

To measure the hardness of a metal part, either the test head or the coil can be used. As a nondestructive test, the method has many advantages. The measurement can be rapidly made, and in the case of the metals comparator, it can cover nearly the full range Brinell hardness.

In using the metals comparator to measure the hardness of a lathe bed, the test head is "standardized" with a sample of known hardness. The test head is moved along the bed way for a continuous comparison of hardness.

As with other applications of the metals comparator, the test head should not be placed too close to the edge of the lathe bed and the surface should be smooth and free from any imperfections. The head should be firmly positioned in the same manner each time a measurement is made.

An accompanying photograph shows the spool type test head used to measure spot hardness. In this application the hardness of the cylinder is required to be uniform within 0.1 pct. The comparator test quickly shows whether the specimens meet this requirement.

In some instances a coil or test head can be used to determine plating thickness. The standard plating thickness is determined by another method and established on the metals comparator. This becomes a reference and all other measurements are referenced to this standard.

SPECIAL test heads, rather than coils, are used to check spot hardness on metal parts.

The method will measure plating thickness on sheets, bars, or rods, but plated products of special shape such as silverware, door knobs, etc. are difficult to measure.

When applying either the metals or magnetic comparator, it is important to remember that it is a relative measuring tool. The instrument signal can be used to indicate a certain property of the metal, but only one variable must be involved at a time or reliable results cannot be obtained.

RODS of different composition but similar size are sorted with comparator and test coil.

For all plants—

Vacuum Tanks Simplify Oxygen Storage Problem

By W. G. Patton
Asst. Technical Editor

◆ New type tanks, built like the familiar hot-and-cold picnic jug, store up to 500 gal of liquid oxygen . . . One tank load is equivalent to 60,000 cu ft of gaseous oxygen . . . Just a turn of a valve delivers oxygen under pressure for many industrial uses.

◆ Storage tanks are made of aluminum for easy mobility . . . Aluminum has the strength and thermal shock resistance required for use with low temperatures . . . Vacuum bottle principle keeps liquid oxygen at —297°F regardless of outside temperature.

◆ LARGE VOLUME of oxygen may now be kept "on tap" at comparatively low storage cost for use in steel mills, foundries and other industrial plants. Equipment recently developed efficiently uses the vacuum insulation principle to store large quanties of liquefied gases. Designed originally for the U. S. armed services by Ronan and Kunzl, Inc., Marshall, Mich., the equipment was recently made available for industrial applications.

These low-cost containers store up to 500 gal of liquid oxygen and deliver up to 60,000 cu ft of gaseous oxygen on demand. Recharging is simply a matter of refilling the tank with liquid oxygen.

With more steel companies installing liquid oxygen plants for new converting processes, some small manufacturing plants felt they were being left out of the picture. Now, any producer of metals or metal products can keep

oxygen on hand for immediate in plant use.

Liquid oxygen is available in all sections of the country through tank truck deliveries from gas producers. But, inexpensive inplant storage of liquid oxygen has been a big problem. With the new storage units, split-second timing of gas deliveries is eliminated.

The new liquid oxygen containers are basically large metal vacuum bottles constructed on the principle of the well-known Dewar vessel. Each unit has all the necessary controls for safe and easy transfer of gas from the tank to the point of use.

Safe easy gas transfer

Compactly designed, the unit includes a storage tank and a self-contained evaporator or pressurizer. The largest, a 500-gal size, measures 5½ ft wide, 6 ft high and 12 ft long. Empty, the unit weighs 2340 lb. When filled, it weighs 7040 lb.

Made of aluminum, the vacuum-insulated container is lightweight, and can be hoisted or moved easily. The unique high-strength properties of aluminum at extreme low temperatures (liquid oxygen is stored at −297°F) make it a "natural" for this type of tank construction.

Evaporation is low

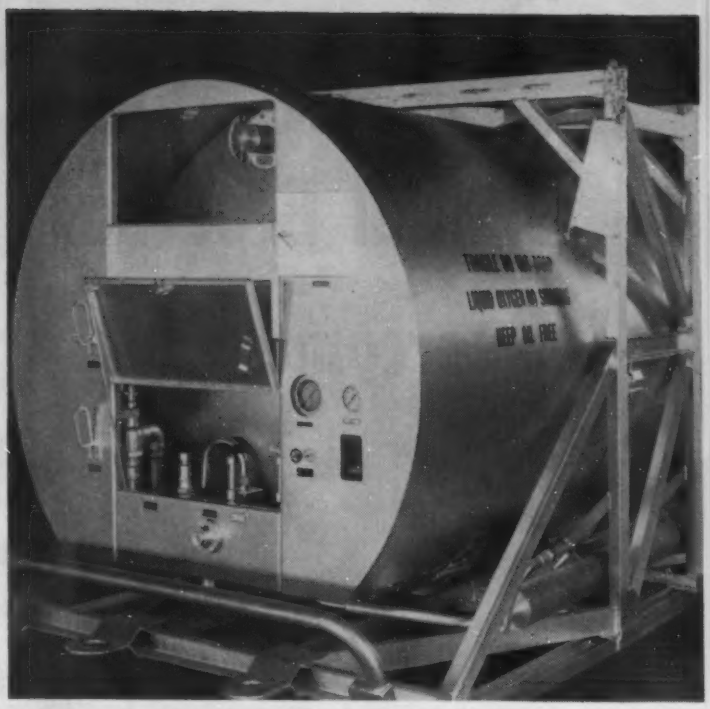
In operation, a turn of a valve starts the liquid to gasify and pressurize the unit. Within minutes, gaseous oxygen of 99.4 pct purity is ready for use at industrial pressures. The oxygen can be piped to any desired plant location, or the entire unit can be mounted on a skid or trailer for mobility.

Liquefied oxygen can be stored in containers of this type at zero gage pressure with negligible loss. Evaporation loss is less than 1 pct per day by volume. The high vacuum insulation minimizes heat leakage so that a temperature of −297°F can be maintained inside the tank regardless of the outside temperature.

The units are made in 50, 150 and 500-gal capacities. The 50-gal size is mounted on a 4-wheel trailer, while the larger units are mounted on skids equipped with hoisting links for easy handling.

Using the principle of the Dewar bottle and a high vacuum for insulation, Ronan & Kunzl, is said to be the first company to produce a liquefied gas container of this type acceptable by the government. These liquefied gas storage and transfer containers have now been in production for more than a year.

According to company officials, Ronan & Kunzl have bridged the gap between laboratory techniques and shop practices in adapting a high vacuum, insulating technique to a large liquefied gas storage container. Three years went into the commercial development of the new type storage units.



SKIDS and hoisting frame on this 500-gal liquid oxygen tank make moving an easy job. Vacuum bottle principle keeps oxygen at —297°F.

MOBILE liquid oxygen container of 50-gal capacity holds equivalent of 25 standard cylinders of gaseous oxygen under pressure.

Better fits—

Special Broaches Overcome Work Hardening Problem

E. J. Egan, Jr.
Machinery Editor

◆ Broaching 0.0005-in. tolerance king pin holes at International Harvester's Fort Wayne plant presented a production problem until specially designed broaches were used . . . Scrap due to oversize holes, out of roundness and poor surface finish has been substantially reduced . . . Closer fits now possible provide longer wear life.

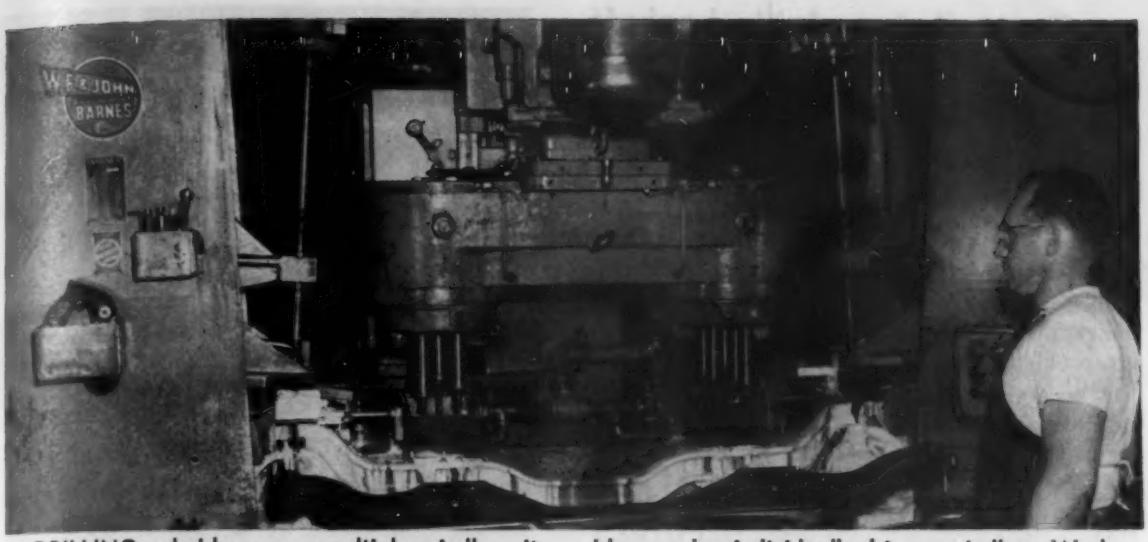
◆ Cost of the broaches is about 50 pct less and tool life is six times greater than those previously used . . . Special broach design removes work hardened surfaces before they can contact and damage finishing teeth . . . Controlled back off angles and narrow lands for finishing teeth contribute to better broach performance.

◆ SCRAP due to oversize holes, out of roundness and poor surface finish has been practically eliminated on a difficult broaching operation at International Harvester Co.'s Fort Wayne plant through the use of specially-designed broaches. The broaches give up to 600 pct longer tool life and cost about 50 pct less than those previously employed to broach 0.0005-in. tolerance king pin holes in truck front axle I-beams.

The two king pin holes, located in opposite ends of the truck axle I-beams, must be held to extremely close dimensional and surface finish tolerances. This is to insure a close fit between the king pin and the hole that long wear life in operation is obtained. If the fit is too tight, assembly problems arise and costs increase.

To obtain ideal fits, reduce assembly problems, and cut scrap costs, a quality control program at Harvester showed that a 0.001-in. tolerance on the king pin holes had to be reduced to 0.0005-in. air gage reading. King pin holes range from $\frac{5}{8}$ to $1\frac{1}{4}$ in. diam and from $2\frac{1}{2}$ to 4 in. long on various models of axles.

The special broach design is a high speed steel



DRILLING axle I-beams on multiple-spindle unit. King pin holes are drilled in each end of axle I-beams by individually-driven spindles. Work hardening can result when drills dull in use.

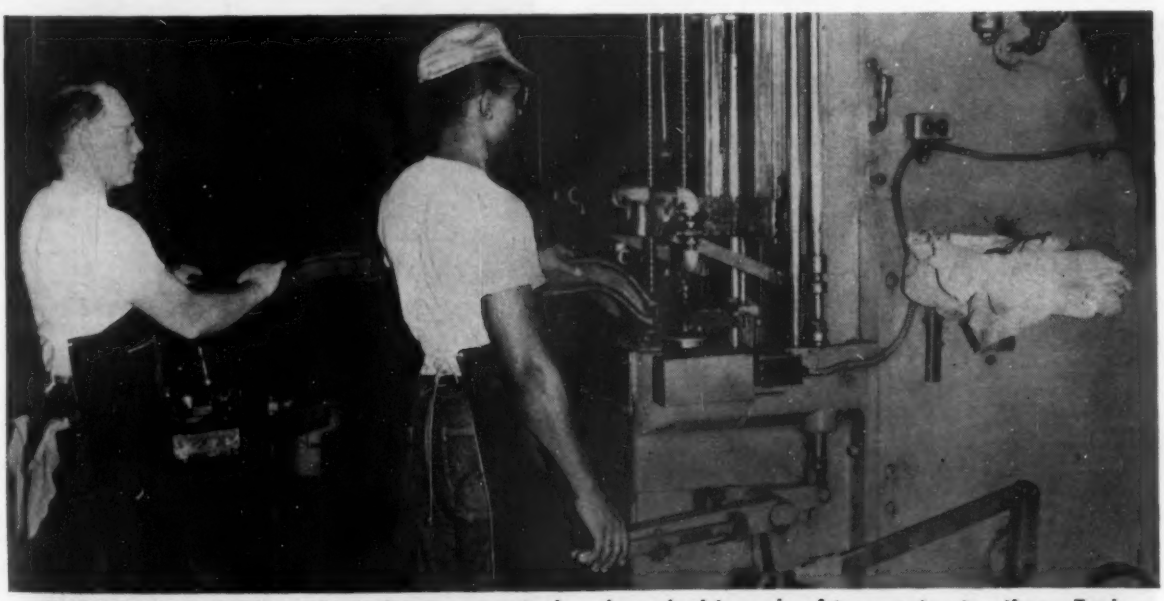
Modified Double Jump type. It removes work hardened hole surfaces early in the broach cutting process and presents easily machinable surfaces to the finishing tooth sections. Controlled low backoff angles and narrow lands on the finishing tooth sections plus a surface treating and stress-relieving process add to the effectiveness of the broach performance. Broaches were designed and built by National Broach & Machine Co., Detroit.

The truck axle I-beams are AISI C-1045 ARR-K fine grain steel forgings (248 to 293 BHn). Steels of this type are subject to work hardening on machining operations, especially if any tool dulling occurs. This condition is encountered in drilling operations on the king pin holes which precede broaching. Holes in a few parts can reach the broaching operation in a work-hardened state because drills dull in use.

If the roughing teeth of the high speed steel broach encounter work hardened surfaces, abnormal tool abrasion results, breaking down the cutting edges. This causes progressive tooth deterioration until even the finish teeth are effected. Tearing of the work and creation of intense frictional heat with its attendant lack of size control results in scrapped parts and broaches. Special broach designs which remove work hardened surfaces before they can contact the finishing teeth provided the solution to this problem.

The truck axle I-beam king pin holes are broached on a vertical single ram pull down broaching machine. Two I-beams are broached at a time with two broaches on the ram of the machine equipped with a common pull head.

The I-beam under the left hand broach is



BROACHING the king pin holes in a vertical pull down broaching machine. The holes are broached in ends of two parts at a time. Each stroke of the ram produces a finished part.

Controlled variable backoff angles on finishing teeth improve broaching performance . . .

turned end-for-end after broaching and placed under the right hand broach to complete the king pin hole broaching operation. A finish broached I-beam is produced with each stroke of the ram. Broaches of different outside diameters are provided for six different sizes of I-beams.

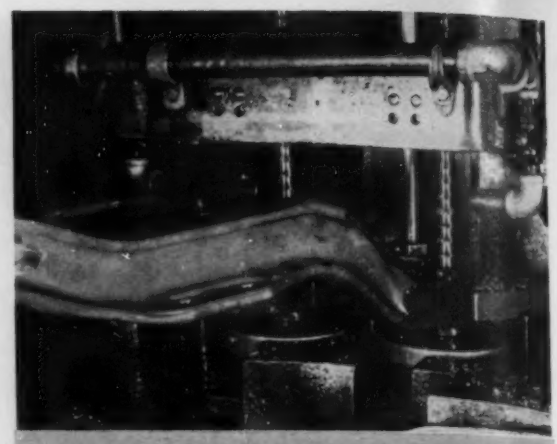
After broaching, the holes are checked for size with a precision air gage near the broaching machine. This gage checks both hole size and out of roundness. The axles are then fed along a special roller conveyor to the next operation.

The broaches used are of a patented Modified Double Jump design. The first broach teeth rapidly generate internal spline teeth in the part to nearly full hole depth. Succeeding round broach sections remove the spline teeth. The remainder of the broach sections resemble conventional round broach tooth sections. The broach thus removes work hardened surfaces quickly before they can contact and damage critical finishing teeth.

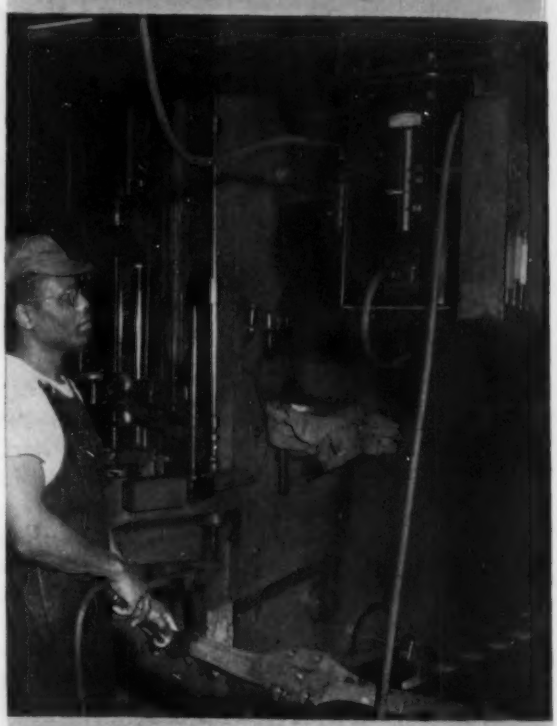
Reduce tooth abrasion

Controlled variable backoff angles and narrow lands for the finishing teeth are other broad design details contributing to better performance. Low backoff angles permit the broach teeth to be sharpened back 0.057-in. before the outside diameter size tolerance is exceeded. Narrow lands on the broach teeth improve broach cutting action and increase tool life since tooth abrasion is reduced and the teeth cut more freely and stay sharp for long periods of time.

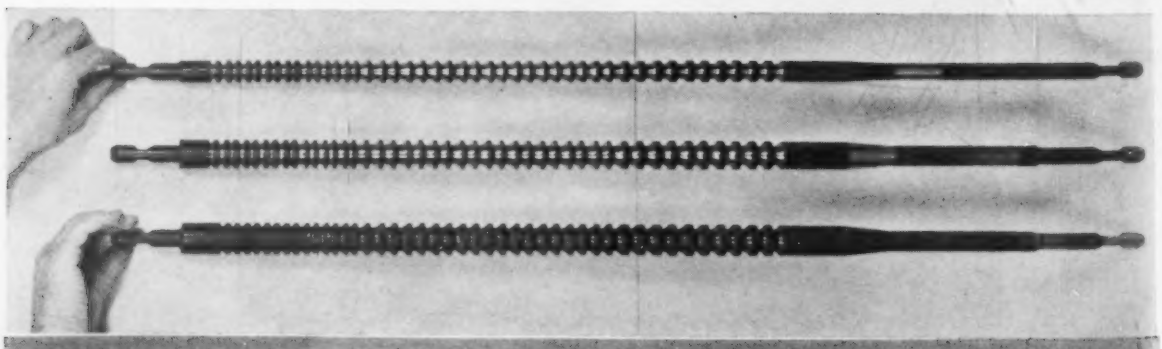
The surface and stress relieving treatment also improves broach performance. This treatment provides a high speed steel cutting tool with a surface hardness of 72 to 75 RC. Thus, face sharpening burrs are pulverized after broaching two or three parts and the broach cuts its gage size. The special broaches remove about 0.015-in. stock on a size from the drilled king pin hole.



SPECIAL broaches used to produce round king pin holes to a 0.0005-in. tolerance are shown in this closeup of broaching operation.



GAGING broached holes is done with this conveyor-mounted precision air gage. Broached hole is checked for size and out of roundness.



THREE sizes of broaches used in broaching king pin holes ranging from 5/8 to 1 1/4 in. diam.

Special broach design reduced scrap losses. Narrow lands on teeth improve broach cutting.

Fewer rejects—

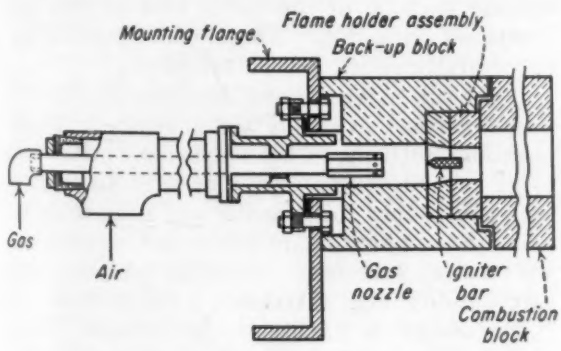
New Burners Heat Skelp Faster, More Accurately

♦ INCREASED PRODUCTION and improved quality in butt weld pipe have been possible at the Sparrows Point plant of Bethlehem Steel Corp. through use of high velocity burners and increased furnace length.

Greater fuel input, increased furnace temperatures and greater furnace length had generally been relied upon to keep pace with growing mill production of butt welded pipe. Physical limitations made further expansion in this direction impractical. A new approach to the heating problem was sought and it was decided to try high velocity burners. Two continuous butt weld pipe mills are operated at this plant. One produces pipe ½ to 1¼ in., and the second produces 1½ to 4-in. pipe. Mill units include skelp welder, loop, furnace, 6-strand forming mill, cut off saw, descaling and sizing rolls, and cooling rack.

Skelp, received in coils is joined by an electric welder. After welding, the coil is run out on the floor in a loop, to provide take up time for making the next weld. The skelp is then fed through the heating furnace, six sets of rolls which form the skelp from flat to round, weld the pipe and reduce the outside diameter of the pipe to finished hot size.

The skelp passes through the furnace, and emerges at a body temperature of 2450°F and an edge temperature of about 2600°F. Furnace temperature is about 3000°F. After the skelp leaves the forming rolls, a jet of air sometimes enriched with oxygen is applied at the seam. This brings the two adjacent edges up to welding temperature before they pass into the welding rolls.



PREHEATED AIR is injected into this high velocity burner through backup block. Fuel burns within 3½ in. combustion block, and gases exit at high speed due to thermal expansion.

High body temperatures cause buckled or warped wells. Low edge temperatures gives poor welds. Low body and high edge temperatures aid product quality and permit operating latitude far beyond the span permissible with limited temperature tolerances.

To improve quality and production of the mill and provide a temperature of 2350°F for the body and 2600°F or higher for the edge skelp high velocity burners were installed. In a trial run 13 burners on each side of the discharge end of the furnace (26 of 356 burners) were replaced with high velocity burners.

Gases exit at high speed

Preheated air is injected into the high velocity burner through a back up block of 2½ in. ID. Fuel burns within the confined area of a combustion block 3½ in. in diam. Exit velocity of the gases is very high due to thermal expansion. The resulting high velocity, high temperature jet-like gas stream impinges directly on the edge of the skelp, rapidly raising its temperature to 2600°F, while the body of the skelp remains fairly constant at 2350°F. Skelp edge can be held at temperatures of 50 to 400°F higher than body temperatures if so desired. Heat transfer to the skelp edge is principally by convection with only a small amount from radiation.

Because of lower body temperature, thin wall pipe can now be successfully made in this mill without high scrap loss. While furnace temperatures are about the same as with conventional burners, lower fuel input has reduced recuperator temperatures and increased their life. Lower recuperator temperature has permitted savings in refractories, burner tiles, and fuel.

Lower forming temperatures and increased depth of weld improve quality and yield of pipe. Lower forming temperatures permit higher mill speeds, without buckling or stretching, which in turn also increases production.

"Use of High Velocity Burners For Edge Heating of Skelp" was described by G. J. Campbell, Asst. Fuel Engineer, Bethlehem Steel Co., in a paper presented at a recent meeting of the Association of Iron and Steel Engineers in Philadelphia. Burners were designed by Thermal Research and Engineering Co., Conshohocken, Pa.

The push is on—

Alloy Steel, Titanium Successfully Hot Extruded

By K. A. Wilhelm
Production Design Engineer
Lockheed Aircraft Corp.
California Div.
Burbank, Calif.

G. A. Moudry
Chief Metallurgist
Harvey Machine Co., Inc.
Torrance, Calif.

Part I

◆ **Industry is rapidly pushing its way into a new metalworking field—the hot extrusion of alloy steels and titanium . . . To broaden the foundation of engineering knowledge necessary to successful hot extrusion of these metals, Lockheed Aircraft systematically studied the basic problems.**

◆ **Aim of the study was to go beyond existing experience in producing extruded shapes economically suitable for use in aircraft parts . . . Extrudability, extrusion temperature, heat treatment, lubricants and die design were studied . . . Steels studied included 8630, 4340, and 431 stainless.**

◆ **Extrusions with good surface and dimensional tolerance were produced . . . Fatigue, tensile and compressive strengths and quality of extruded sections were equal to or better than those of wrought materials.**

◆ ALLOY STEEL AND TITANIUM can be successfully hot extruded into shapes which can be simply and economically converted into aircraft structural parts. Good surfaces and tolerances, and satisfactory metallurgical and mechanical properties have been achieved as a result of extrusion studies initiated by Lockheed Aircraft Corp., Burbank, Calif., and conducted by Harvey Machine Co., Inc., Torrance, Calif.

Development of successful hot extrusion methods which could be applied to production of aircraft parts were sought in a research program sponsored by the United States Air Force. Data obtained offer all industry an opportunity to profit through wider application of the hot extrusion technique. For both alloy steels and titanium appreciable cost savings can be realized through hot extrusion. Costly machining of shapes from bar stock can be eliminated and chip waste reduced.

Modern aircraft require metals with enduring strength at higher temperatures. It is also necessary to load structural members to greater stresses as speeds increase. The extrusion process permits fabrication in relatively small lots of shapes too complex to be rolled. Extrusion is a relatively lower cost production method because of the lower cost of dies as compared with rolls. Alloys which cannot be successfully rolled can be extruded.

Lockheed, using Harvey Machine Co. facilities undertook to supply the answers to basic questions relating to hot extrusion. Aim was to go beyond existing experience in producing extruded shapes functionally and economically suitable for manufacture of aircraft structures. Die design, lubricant, extrusion temperature, extrudability, heat treatment, were studied.

Die design is of utmost importance. Die configuration controls the flow of metal into and through the extrusion orifice and largely determines ease of flow, retention of lubricant, extrusion tolerance, and wear life of the die, as well as die cost.

A 1650-ton horizontal hydraulic press was used. Container diameter was 6⅜ in. for steel and 5½ in. for titanium. The press, substantially an aluminum press with minor modifications to permit its use for steel, has a maximum ram speed of 6 ips.

Maximum ram speed for aluminum extrusion is 1 ips, and for brass 3 ips. Maximum hydraulic pressure was 4200 psi. This corresponds to a pressure of 138,000 psi on the back of the billet in the 5½-in. diam container, and 103,000 psi on the back of the billet in the 6⅜-in. diam container. Steel billet diameter was 6 3/16 in. Titanium billets were 5 in. in diam.

Stretching equipment normally used for straightening aluminum extrusions was used for steel shapes. Soft jaws and grippers were replaced with hardened inserts.

Heated in salt bath furnace

Fairly small billets were used. Cooling rate of steel billets at 2200°F was about 100°F per min, it was necessary to have heating facilities close to the press to prevent undue billet heat loss during transfer. A 100-kw electric salt bath furnace with submerged electrodes was used. Rated capacity was 300 lb of steel or titanium per hr to extrusion temperatures. The heating medium, barium chloride, had an operating range of 1700° to 2400°F. A hoist and loading tongs were used to transfer billets from furnace to press. Billet transfer from furnace to press generally required about ½ min.

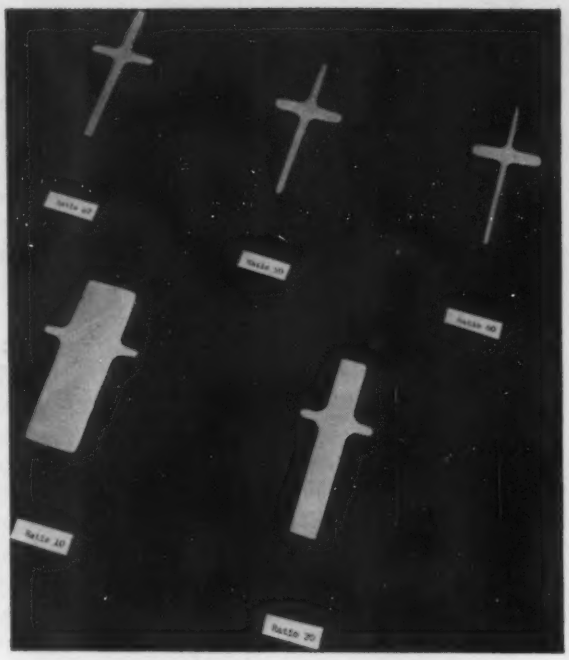
Temperature depends on alloy

Billets were preheated in a gas furnace to about 900°F, then heated in the salt bath furnace to about 2200°F. Actual temperature depended upon alloy used and other experimental conditions. Since salt provided some lubricating qualities, adhering salt was left on the billet when the billet was introduced into the press. Billet support fixtures were designed to keep the billet axis horizontal in the salt bath to insure adherence of a generous quantity of salt.

Lubricants, temperature and extrusion ratios were studied by hot extruding steel rounds. Five lubricants were studied under closely controlled duplicated conditions. Steel rounds of SAE 4340, 0.877 in. diam, extrusion ratio 50 to 1, were extruded. Lubricants included: molybdenum-disulfide and graphite, glass wool, white mica, lime feldspar, and barium chloride-sodium chloride salt mixture.

Extrusions with good surface and dimensional tolerance were produced using moly disulfide graphite or glass wool as a lubricant. Die scoring was a problem and further development work on lubricants is highly desirable.

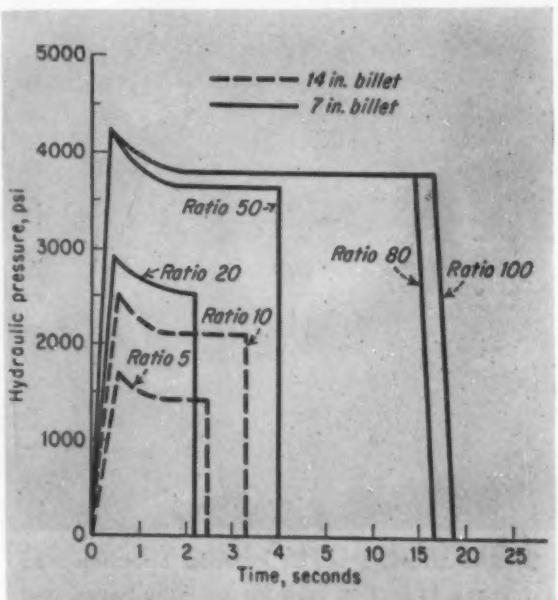
In temperature studies 410 stainless steel rounds were extruded at 1950°, 2000° and 2150°F, at three extrusion ratios. Object was to determine the effect of temperature on extrudibility as well as on surface condition and



CRUCIFORM SHAPES were used to find extrusion limits, whether complex shape will fill die.

die wear. Optimum extrudibility is obtained at 2150°F.

To determine the effect of extrusion ratio on extrudibility and alloy properties, SAE 8630, 4340 and type 410 stainless were extruded in six extrusion ratios: 5:1, 2.770 diam; 10:1, 2.017 diam; 20:1, 1.417 diam; 50:1, 0.877 diam; 80:1, 0.700 diam; 100:1, 0.630 diam. Data shows that in 8630 and 4340 steels grain refinement takes place as extrusion ratio increases. This is also true for 410 stainless steel; an appreciable increase in tensile yield and ultimate tensile strength occurs from increase in extrusion ratio. In all cases higher ratios cause additional



AVERAGED extrusion pressures vs. time with 410 stainless steel. Extrusion temperature, 2150°F.

Special slenderness ratio shapes were made up to develop data on the extrudability of steel . . .

die wear and also higher extruding pressures.

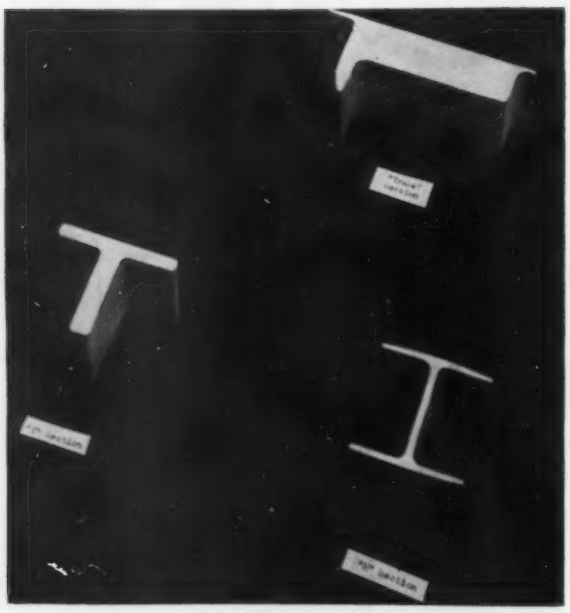
Forty-five steel "shapes" were extruded from SAE 4340, 8630, and types 410 and 431 stainless. These shapes, were divided into two groups, slenderness ratio shapes, and shapes for aircraft components. Glass wool was used as a lubricant.

Billets, forged, annealed and rough turned were extruded at 2150°F. Extrusions in ratios from 10 to 60, ranged from 5 to 32 ft in length.

Slenderness ratio shapes were extruded to develop information on the extrusion limits of steel. "Extrusion limit" is the minimum thickness of section which can be extruded, and the ratio of thickness between two adjacent sections. "Slenderness" ratio is important in determining if a complex shape will completely fill the die opening.

Five cruciform-shapes were designed consisting of a web and cross member, either of which could be varied in thickness. The shapes provided extrusion ratios from 10 to 60. By noting how these shapes conformed to the die configuration, limitations of slenderness ratio were determined.

Filling was best in heavy sections, poorest in adjacent thin sections. Best dimensional accuracy was obtained when both legs of the cross shape were about equal in thickness. Die wear and pressure increased as sections became thinner.



STRUCTURAL SHAPES included T section used as track, H section used for longeron beam, and complex flap track section which combined heavy body section with thin flange sections.

Structural shapes were extruded to find which configurations might actually be produced for use in current aircraft. Three shapes extruded consisted of: (1) Simple T Section, used as a track; (2) Thin walled H Section, used as a longeron beam; (3) Heavy bodied complex shape with thin flanges or legs, used as flap track. Each shape was produced in SAE 8630, 4340, and type 431 stainless steel.

Both T and H sections filled the die opening well as long as the die remained in good condition. Thin legs or flanges of heavy track section were difficult to fill however. As indicated by slenderness ratio tests, this shape exceeds the limits for extrudable configuration for steel by present techniques.

Surface of all shapes extruded was satisfactory. Physical tests showed the material was free from defects. Fatigue, tensile and compressive strengths were equal to, or better than those of wrought materials. Each extrusion was measured for dimensional die wear. Samples of both T and H sections were straightened, heat treated and machined into finished production parts.

Heat Treat, Straightening

Straightening steel extrusions after heat treat is more difficult than straightening of heat treatable aluminum alloys. Aluminum extrusions which become badly distorted during solution heat treatment are stretch straightened immediately following quenching. In this condition aluminum is still soft and easily stretched. It hardens after stretching by natural or artificial aging.

With steel however, no such soft transition stage exists. Quenching produces an immediately hard material, martensite, which must be tempered to restore ductility and softness. After heat treatment, bow was present in some shapes; the amount of lateral deviation was about 6 to 12 in. in 12-ft length extrusions. It was possible to remove all bow and twist by stretching and detwisting (1½ to 2 pct stretch) at the hardness level of this heat treatment, about 180,000 psi.

Extrusions were cut into 12-ft lengths for heat treating since this was the greatest length accommodated by the only vertical steel heat-treating furnace in the area. Extrusions were heat treated and quenched in a vertical position to keep distortion at a minimum.

Metallurgy-Physical Properties

Each metalworking method produces peculiar metallurgical characteristics. In extrusion, the degree of metalworking increases from front to rear, and decreases from center to surface of the extrusion. Variation in degree of hot

work will result in a variation of grain size and grain coarsening temperatures. The greater the reduction, the finer the grain size.

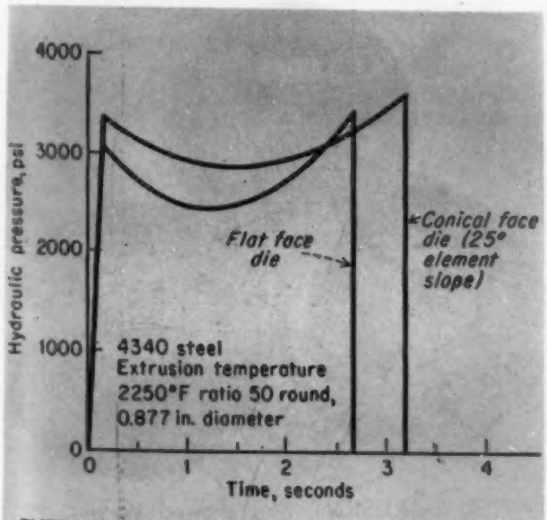
Contrary to this, the greater the degree of hot work, the lower the grain coarsening temperature. However, the range of hot work encountered does not lower the coarsening temperature to a degree which might result in appreciable coarsening during annealing, normalizing, or hardening. Characteristics of the extrusion process, is the relatively hydrostatic stress state which results in a high density metal. Continuity of flow lines is good and there is little tendency for sponginess. This means good elongation, high reduction of area, and good notch impact strength in transverse directions.

Characteristic extrusion effect resulting in enhanced tensile and yield strengths in the extrusion direction was not observed. Such extrusion effect is a result of preferred orientation. Any preferred orientation of austenite would be lost as the steel extrusion cools through the transformation temperature. As a result, ultimate and yield strengths would be nearly independent of specimen orientation.

Quality equals rolled metal

Quality of extruded sections would be about equal or superior to rolled section. Possible differences might be slightly better transverse ductility and toughness, but slightly more grain size variation.

The normality of extruded steel is supported by studies of microstructure. SAE 8630 shows a Widmanstatten structure in which the light etching ferrite has formed along certain crystallographic planes as well as at grain boundaries. This is a result of an air cool from a very high austenitic temperature. The high temperature increases the hardenability of the medium hardenable 8630 and subsequent air cooling results in proeutectoid ferrite forming at a lower temperature. This lower temperature ferrite is nucleated along definite crystallographic planes.



EXTRUSION PRESSURES were no higher for flatfaced dies than for conical dies.

The 4340 structure shows the typical mixed proeutectoid ferrite, upper and lower bainite, and untempered martensite of a fairly deep hardening steel when air cooled in a small section.

The type 410 stainless structure is nearly completely a low carbon untempered martensite. This is consistent with the air hardening characteristics of 410 stainless. Ultimate and yield tensile strengths of 410 stainless decrease with extrusion temperature. At 1950°F extrusion temperature the structure is completely austenitic. At 2000° and 2150°F progessively more ferrite is stable. Chromium narrows the stability range of austenite. Upon cooling, this ferrite is not available for martensitic hardening and remains as patches of ferrite in a martensitic matrix. Reheating within the austenite field will entirely eliminate this effect.

Air hardenability of 8630 is so low that even the 0.680-in. round resulting from the 100 to 1 extrusion ratio did not air-harden appreciably.

The tensile strength of 190,000 psi in the 2.77-in. section, extrusion ratio of 5 to 1 and a gradual increase in smaller sections is indicative of the hardenability of type 410 stainless when cooled from 2150°F.

Heat treated properties of these alloys were not noticeably affected by extrusion ratio. High reduction of area values obtained are indicative of sound material, relatively free of porosity and detrimental inclusions, and probably possessing good impact properties.

Grain structures compared

A comparison of "as extruded" reduction of areas relative to the normal expectancy curve for quenched and tempered structures, indicates the material should not be placed in service in the as-extruded condition.

These low reduction of area and elongation values can be accounted for by referring to the as extruded microstructures. SAE 8630 shows a mixed structure of grain boundary ferrite, Widmanstatten ferrite, and Fe_3C with a large prior austenitic grain size. In 4340 there is a mixed structure of untempered martensite, blocky ferrite, and bainite, again with a large prior austenitic grain size.

Type 410 stainless shows up as principally untempered martensite. Full heat treatment was required to obtain a satisfactory structure in the 8630 and 4340 extrusions. However, in smaller section 410 stainless, where the as-extruded structure was nearly completely untempered martensite, a normal draw gives excellent properties.

SAE 8630 shows no tendency for air hardening. The 4340 steel air hardens strongly in

Forty-five steel shapes were extruded from several steel alloys during the tests . . .

sections below 0.3 in. and 431 air hardens at all thicknesses considered.

Lubricants

Glass wool was generally the most effective lubricant for both steel and titanium during the development program. Other lubricants tested, in their order of effectiveness, included molybdenum disulfidegraphite, lime feldspar, molten salt, and white mica in powdered and sheet form. All billets for the lubricant tests were 4340 steel, extruded at 2150°F. Diameter of the extrusion was 0.877 in., corresponding to a 50 to 1 extrusion ratio.

To test glass wool as a lubricant, a glass wool blanket was wrapped around the hot billet and glass wool was laid in the container in advance of the billet. Molten salt from the heating furnace was left on the billets. Extrusion pressure, time and extruded surface condition were almost identical with those obtained when using molybdenum disulfide lubrication. Tolerances obtained were not significantly different. Die wear was quite rapid. Light scoring resulted after three extrusions.

Several lubricants compared

A commercial molybdenum disulfide in grease (containing an inert filler which does not fuse below 2000°F) was mixed with graphite. The mixture was coated on cold tooling (die and container) and renewed at the beginning of each test series.

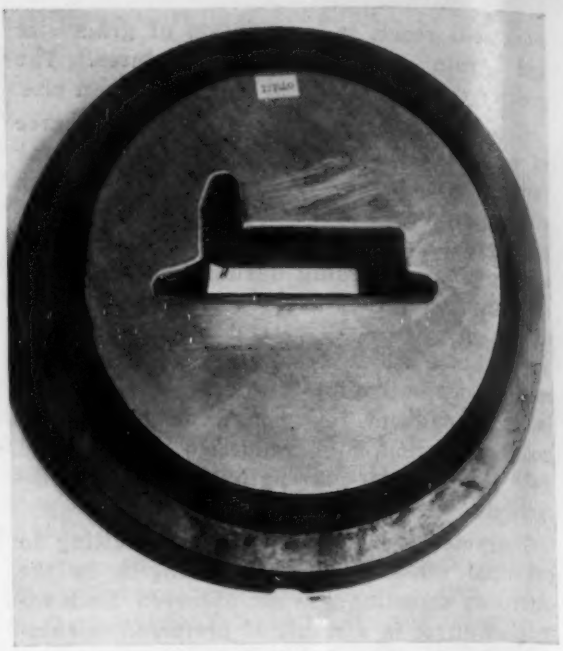
A tallow-graphite mixture was applied over the moly-disulfide mixture and this was renewed before each extrusion. The tallow-graphite mixture gave body to the lubricant and helped retard oxidation of molybdenum-disulfide. No significant difference was apparent with minor changes in proportions of the lubricant makeup. Results indicate that (1) extruding pressures are low, comparable to those for aluminum alloys, (2) surface of extrusions is good, (3) die wear is extensive.

Lime feldspar is considered inferior to moly-disulfide or glass wool lubrication but superior to white mica lubrication. It provides fair die protection, but considerable scoring resulted on the extruded surface.

In every case, lubrication or extrudability was aided or affected by the molten salt remaining on the billet from heating. The salt also prevents billet oxidation during transfer from furnace to press.

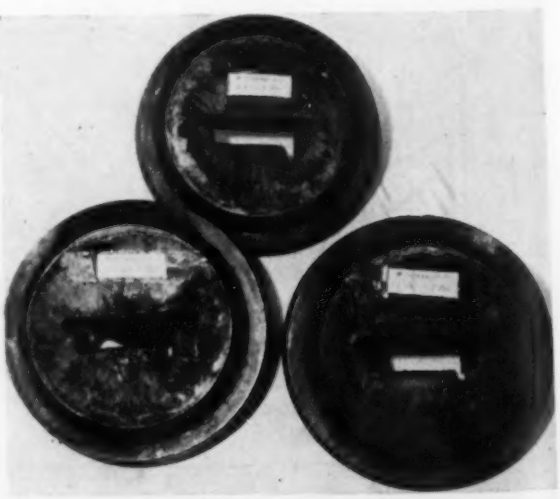
The salt mixture used in heating was also tested to determine its effectiveness as a lubricant. In all other tests, salt was present in addition to the specific lubricant being tested. The salt, 85 pct barium chloride, 15 pct sodium chloride, has a narrower melting range than the refractory solids. Its melting point is considerably below the metalworking temperature.

Molten salt lubrication was tested by carefully handling the billet during transfer to retain as much adhering salt as possible.

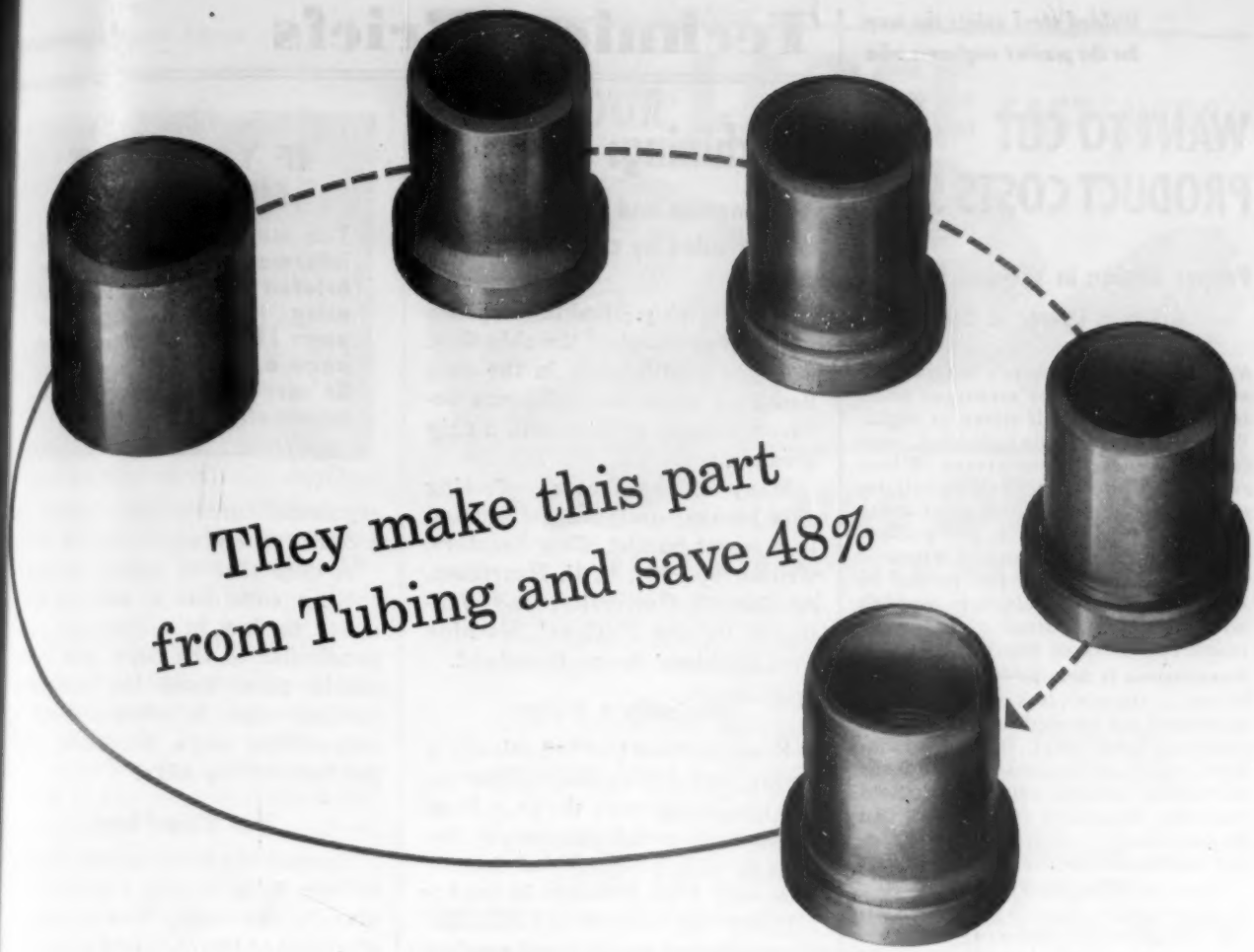


FLAP TRACK DIE as it appeared before use for extruding steel track at the Harvey plant.

TITANIUM—Part II of this two-part article on hot extrusion will present Lockheed's experience in extruding titanium, and will appear in the May 13 issue of The Iron Age.



AFTER EXTRUSION, dies showed varying degrees of wear depending on metals extruded, shapes extruded and lubricants used.



They make this part from Tubing and save 48%

This part used to be made out of solid bar stock on a screw machine. Costly? You bet. 12½ cents each. Lots of expensive machining. Lots of metal wasted to make a hole.

Now, Northwestern Corporation, Morris, Ill., makes it out of tubing. ELECTRUNITE Mechanical Tubing, 1½ O.D. x 11 gage. The customer gets it in 14-foot lengths, cuts it off into 2" lengths.

Next, the tubes are formed in a series of dies. Pretty drastic reductions, but the ELECTRUNITE Tubing can take it. Then they're machine finished in one operation.

The result: Each part now costs only 6½ cents. Multiply that by several million parts a year the manufacturer produces and you come up with a sizable saving.

Unusual, you say? Not at all. Republic has helped a lot of manufacturers cut costs drastically by helping them design with Republic ELECTRUNITE Tubing. A call to your nearest Republic Sales office will bring you all the facts.

REPUBLIC STEEL CORPORATION
Steel and Tubes Division
216 E. 131st Street, Cleveland 8, Ohio
GENERAL OFFICES • CLEVELAND 1, OHIO
Export Department: Chrysler Building, New York 17, N. Y.

Republic
REPUBLIC STEEL
ELECTRUNITE TUBING

Technical Briefs

Machining:

Formation and flow of chips controlled by chip breaker.

IF YOU WANT MORE DATA

You may secure additional information on any item briefed in this section by using the reply card on page 117. Just indicate the page on which it appears. Be sure to note exactly the information wanted.

Efficient chip breaking depends on proper control of the chip flow. A slight modification in the chip flow may mean the difference between success or failure of a chip breaker.

Many of the factors affecting chip breaker design are discussed in a recent booklet, *Chip Breakers*, written by Prof. E. K. Henriksen, of Cornell University, and published by the National Machine Tool Builders' Assn., Cleveland.

Basically A Wedge

Every cutting tool is basically a wedge, and during the cutting operation it separates the chip from the parent metal and forces the chip to slide over the tool face.

A very high pressure is gradually built up between the chip and the surface of the tool and reaches a maximum a short distance behind the edge, where cratering may develop. From this point on, the pressure drops rapidly to zero, and the chip leaves the face of the tool.

Built-up Edge Forms

At low and moderate cutting speeds, a small built-up edge is formed on the edge of the tool. The chip is of the segmental type and has a natural curl. The segmental chip contains a large number of cracks, is brittle and easy to break.

At higher speeds, the built-up edge gradually becomes smaller and may finally disappear, and the segmental curling chip changes to a continuous almost straight chip.

A chip passing over a straight cutting edge has a natural tendency to flow in a direction perpendicular to the edge. For most single point tools the complete cutting edge is composed of a side-cutting edge, the nose, and the end-cutting edge.

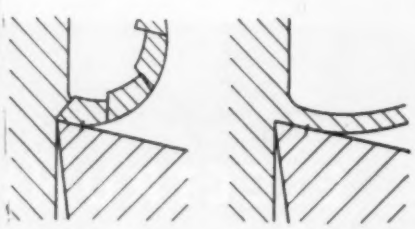
How Chip Flows

General tendency of the chip is to flow in a direction perpendicular to the edge. The resultant direction of the chip flow is a compromise between the effect of the side-cutting edge and the effect of the nose and the end-cutting edge.

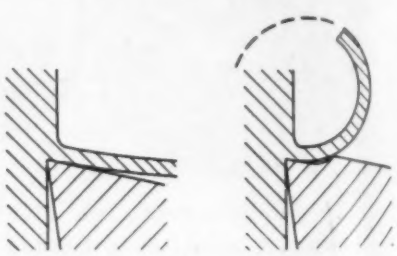
With a large depth of cut the effect of the side-cutting edge is dominating, and the chip flows almost perpendicular to the side-cutting edge. With a small depth of cut the effect of the side-cutting edge is considerably reduced, and the effect of the nose and of the end-cutting edge is strong enough to swing the chip away from the surface of the work.

Tool Materials Compared

The sintered carbides and to some extent the cast alloys permit



Cutting tool a wedge . . .



Chip flow compared . . .

a considerable increase in cutting speeds in comparison with high speed steel. With respect to chip breaking there is no principal difference between these two new types of tool materials.

Slides Over Tool Face

In cutting operations with high speed steel tools the chip slides over the tool face at a speed of from one-half to one-third of the actual cutting speed. The chip has a natural curl which further reduces its velocity, and the operator has ample time to guide the curling chip into the pan.

Generally Easy to Control

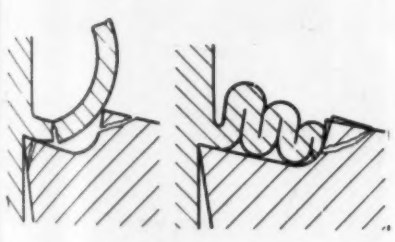
Frequently the chip is of the segmental type with a rough surface like a file. It is brittle and can be broken into fairly regular pieces. It does not crowd the working area nor block the coolant. The cutting temperature is low, and even in dry cutting operations the chip seldom gets so hot that it turns blue.

In general, the chips from high speed steel tools are easy to control and handle and present no hazards to the machine operator.

At Higher Speeds

Carbide tools operate at much higher cutting speeds and utilize more power. This means that more metal is removed per minute, and therefore more chips are produced. At these higher speeds the chip flows over the tool face at or near the cutting speed, which may be three to six times as high as with high speed steel tools.

The extra energy and the tool



Avoid overcrowding . . .

Turn Page

Desired amount of chip breaking can be obtained by bending the chips to give proper chip flow control . . .

load required to form the chip into a soft curl and break the curl at regular intervals are negligible for all practical purposes.

Tool wear is the same as with a straight chip. Practical shop tests and laboratory experiments have confirmed that a chip breaker tool, well designed, carefully ground and honed, and properly applied, has at least the same useful life as a straight tool without a chip breaker.

With overbroken chips the situation is radically changed. The high tool loads that occur when overbroken chips are formed should be avoided since tool life is shortened. The tool wears faster and may actually break down at the cutting edge or at the chip breaker itself. Another danger is from the flying chips produced under these conditions.

Tight chips, fragments, and splinters are definitely harmful. Half moons represent only the initial stage of overbreaking and should be avoided on production jobs.

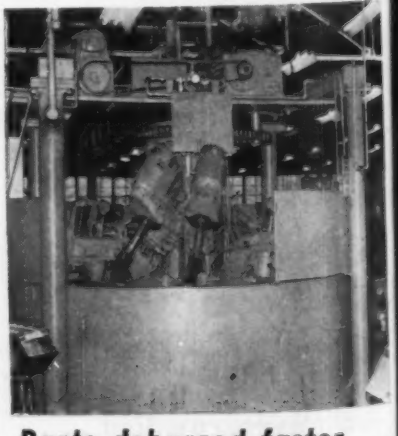
To obtain the desired degree of chip breaking for a particular feed, two facts must be remembered. (1) Chip breaking depends upon the control of chip flow. (2) Chip flow control is accomplished by bending the chip. The same amount of bending produces the same degree of chip breaking. By changing the amount of bending, the degree of chip breaking is also changed.

Deburring:

Automatic precision machine saves costly hand work.

Critical deburring and finishing operations done by hand can often be quite costly and time consuming. Results can vary considerably, may be inconsistent to the point of high scrap losses.

To solve these problems, the Mechamatic wet abrasive process and automatic equipment have been developed by the Mecha Finish Corp., Sturgis, Mich. The machine operates on precision standards to rapidly and uniformly de-



Parts deburred faster . . .

Turn Page

The answer to most of your questions about stainless steels are right at your finger tips, when you use Crucible's unique new Stainless Steel Selector.

Want to know the machinability characteristics of a stainless grade? Resistance to corrosion or scaling? Physical or mechanical properties? You can get the answers to these and other questions simply by setting the arrow on the Selector slide at the proper window. It's just as quick and easy as that.

And almost as fast as you get the answer, you can get the steel you need. For many of the REZISTAL stainless steels shown on the Selector are carried in stock in Crucible warehouses conveniently located throughout the country.

To get your free copy just fill in and mail the coupon. Better do it now.

HOW THE SELECTOR WORKS:

Start with the problem. For example, resistance to corrosion in contact with copper sulfate. Just set the slide at the proper index number shown on the Selector (in this case on the back), and you have the answer in a second – grades 302 and 316 are fully resistant to this form of attack.

Crucible Steel Company of America
Dept. I, Henry W. Oliver Building
Pittsburgh, Pa.

Name_____

Company_____ Title_____

Address_____ City_____ State_____

CRUCIBLE first name in special purpose steels

54 years of Fine steelmaking

STAINLESS STEELS

CRUCIBLE STEEL COMPANY OF AMERICA, GENERAL SALES OFFICES, OLIVER BUILDING, PITTSBURGH, PA.

REX HIGH SPEED • TOOL • REZISTAL STAINLESS • MAX-EL • ALLOY • SPECIAL PURPOSE STEELS

—Technical Briefs—

burr, radius, corner break and improve surface finish of metal parts.

Does Many Jobs

Production experience has been extensive on such aircraft and automotive parts as turbine blades, gears and bearings.

Equipment is designed to consistently radius or break corners and edges to a thousandth of an in. Such accuracy on high production is hard to obtain where hand or semi-automatic methods are used.

Controlled Abrasive Flow

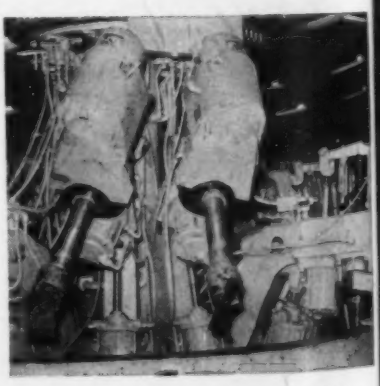
Major radii can also be produced on the equipment; in most cases without dimensional changes on flat surface areas. Low microinch surface finishes obtained are classed as nondirectional compared with visual polish lines left by other methods.

The process features a controlled, high speed directional flow of minute abrasive particles in a wet slurry. There is no abrasive recovery or return problem in the self-contained machine unit.

Has Adjustable Features

Parts are held in the abrasive by spindles which are adjustable to favor the area or surface to be finished. Each spindle is automatically presented to the machine operator at the end of a predetermined time cycle.

As each spindle emerges from the abrasive mass, its holding fixture opens automatically. The part is removed for washing and another part inserted.



. . . in automatic machine

Turn Page

Gaging:

Nuclear gage continuously checks coating thickness.

Zinc-coating weight on galvanized sheets and coils has long been measured by chemical analysis of samples from finished products. A new gage uses a fission product of uranium to continuously measure coating thickness on fast moving steel strip.

Aids Quality Control

Initial application of the unique atom-powered instrument is in Armco Steel Corp.'s continuous zinc-coating process. The gage continuously measures thickness of the coating along the length of the strip, across its width and on both sides.

The rapid, accurate instrument is the result of a 3-year joint research program by Armco and Industrial Nuclenoics Corp., Columbus, Ohio. The nuclear gage should improve quality control and efficiency in coating operations. It also creates the opportunity for automatic control of the coating process.

Use Radioactive Element

Heart of the new gage is a radioactive element which emits beta rays. A radiation detector picks up rays reflected by the coated steel. An electronic unit translates these impulses into inked lines on a recording chart. They indicate coating thickness in standard units.

The gaging head of the unit automatically ranges across the width of the strip. Armco uses two gages to measure the coating on each side of the strip. Chemical analyses give only an average coating weight for both sides.

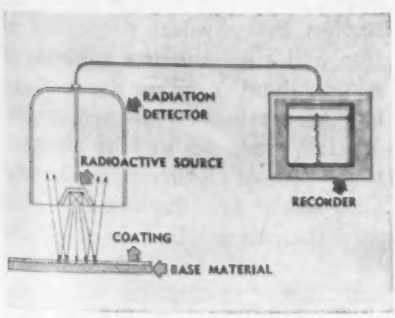
Detect Minor Variations

Called the Accuray Reflection Gage, the atomic measuring instrument detects even minor variations in coating weight. The unit includes automatic compensation for changes in humidity, temperature, and dust content of the air.

For Other Materials

Similar type gages produced by Industrial Nuclenoics are being used to measure the thickness of paper, rubber, plastics, and textiles. But the new instrument is the first to continuously measure thickness of a galvanized coating.

Turn Page



Checks coating thickness . .

New Books:

Production, management problems discussed in new books.

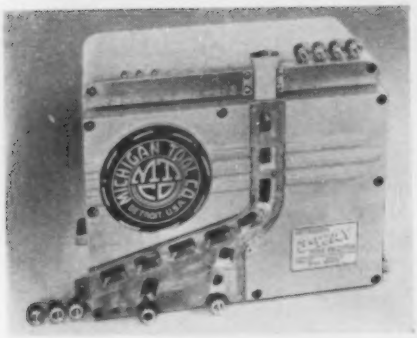
"Induction and Dielectric Heating," by J. Wesley Cable. Divided into two major sections dealing with induction and dielectric heating, the book offers a carefully organized treatment of the latest uses and applications of high-frequency heating in industry. Reinhold Publishing Corp., 330 West 42nd St., New York 36. $12.50. 576 p.

"Basic Patterns in Union Contracts," third edition. Comprehensive analysis of 400 contracts drawn with due regard to the factors of Industry, Union, Coverage, Area, Manufacturing and Non-Manufacturing Plant. Tables, appropriate notes and table of contents are included. Book is a useful yardstick for negotiators for measuring their own contract provisions, proposals and techniques, against terms found in similar agreements now in effect. The Bureau of National Affairs, Inc., 1231 24th St., N.W., Washington 7, D. C. $1.25. 56 p.

"Werkstoff-Handbuch Stahl & Eisen," Third edition. Reviewed by W. Trinks, Professor Emeritus, Carnegie Institute of Technology. This materials handbook deals with every known property of iron and steel and also with some related subjects. The first group of papers contains general information such as specific gravities, atomic weights, periodic system of elements, metric-British conversion tables, tolerances, etc. The second group describes the physical properties of iron and steel and the methods of testing them. Another group shows how properties are affected by production processes and by composition. Almost all the commonly used alloy-steels are discussed. Other subjects covered include steels for specific uses and heat treatment and other treatments of steels. Verlag Stahleisen, Dusseldorf, Germany. $18.60. 130 p.

NEW EQUIPMENT

New and improved production ideas, equipment, services and methods described here offer production economies . . . just fill in and mail the postcard on page 117 or 118.



Gear selector segregates gears into 3 categories

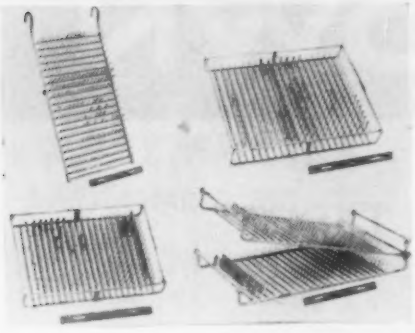
Gears can be segregated into satisfactory, oversize and undersize categories on a new automatic gear selector. The machine operator feeds gears into the selector, or gears can be inspected in a fully automatic setup without requiring any operator attention. An automatic shut-off, coupled with a counter, can be furnished to stop the production machine if any number of consecutive gears (number is optional) are rejected or the percentage of rejects on a given run exceeds set limits. Two accurate master gears, one of which is motor driven, are used to check the gears being produced. *Michigan Tool Co.*

For more data circle No. 30 on postcard, p. 117.

Immersion heater can be used glowing hot

New heating unit can be used glowing-hot directly in an acid bath. It is a wand of fused quartz, less than ½ in. diam, encasing a 400-w heating coil, which can be held in the bare hand while 7 of its 12 in. glow red-hot. Pop it into a reaction flask in the laboratory and there is instant, concentrated heat exactly where wanted. Because of the resistance of quartz to thermal shock, the Glo-Quartz heater does not crack, break or short-circuit under this treatment. It is stated that the Glo-Quartz brings 250 milliliters of water to boiling in 3 min. *Fisher Scientific Co.*

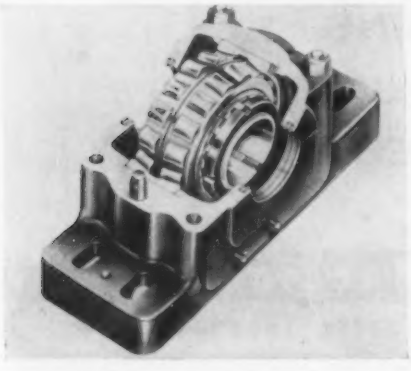
For more data circle No. 31 on postcard, p. 117.



Steel racks for handling small tubular pieces

Steel racks, designed to hold a variety of small tubular pieces such as pen and pencil barrels, lip stick cases, etc., include hanger, basket and tray types each with 300 to 340 pins. The trays provide an efficient and speedy means of assembling and handling such tubular items for cleaning, degreasing and painting. Entire assembly of each rack is welded, making for rigid construction and long life. Pins are set at an angle to prevent work from falling off and ease of loading and unloading. Pin length and center distances can be varied. *Capitol Machine Co.*

For more data circle No. 32 on postcard, p. 117.

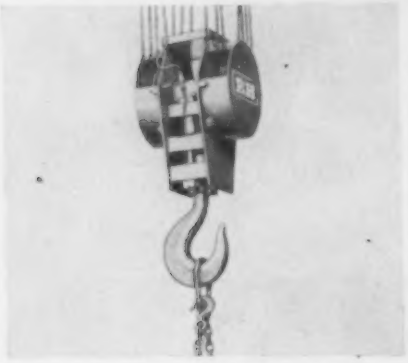


Mill bearings for heavy loads, severe impact

New, heavy duty roller bearings are designed for severe operating conditions found in steel mills, mines and foundries. These mill bearings incorporate precision Link-Belt self-aligning roller bearings in a rugged steel pillow block housing. The housing has heavy sections, an especially rugged base and cap, plus large studs, dowels and mating surfaces. Its split construction facilitates installation. The roller bearing aligns itself instantly without impairing full load carrying capacity, even when subjected to minor shaft deflections and normal inaccuracies of mounting. These new mill bearings can be lubricated with oil or grease. *Link-Belt Co.*

For more data circle No. 33 on postcard, p. 117.

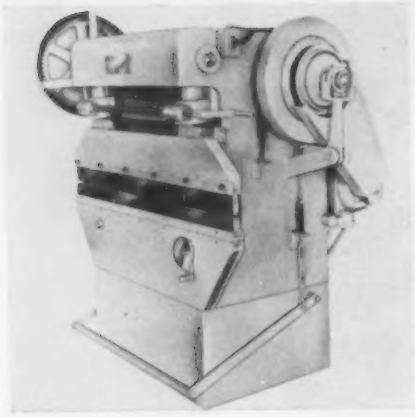
Turn Page



Crane scale weighs while handling load

Electronic weighing device for overhead cranes provides accurate weighing service for any type of load while it is being handled, thereby saving time and costs. With the Hook-a-Weigh, a separate weighing operation in many cases is eliminated, with products moving directly from one phase of production to the next without stopping. Weight is brought to bear directly upon a load cell built into the load block. An electrical signal is transmitted through a cable and brushless type cable reel to the recording instrument which may be of visual or recording type mounted in the crane cab or other location. Capacities to 200,000 lb are available. *Harnischfeger Corp.*

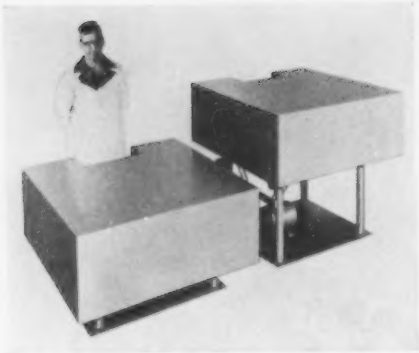
For more data circle No. 34 on postcard, p. 117.



Sheet metal bending brake for production runs

Powered by a ¾ hp motor, the Connecticut press brake will bend 16 gage mild steel 4 ft wide over a ½ in. die opening or 10 gage 2 ft wide over a 1⅛ in. die. The brake has a speed of 40 strokes per min, with deflection minimized by special support of the main crank shaft at both ends. Features include Oilite bearings on all shafts, anti-friction bearing mounting of the flywheel. A back gage is built in as standard equipment and is operated from the front, convenient to the operator. This permits rapid accurate resetting, speeding up production on varied bending operations. The brake may also be adapted to multiple punching within its capacity. Maximum die space is 7 in., stroke 2 in. and adjustment 1½ in., giving a shut height over die block of 3½ in. *W. Whitney Stueck Inc.*

For more data circle No. 35 on postcard, p. 117.



Machining jobs speeded by use of pack lifters

Devices for maintaining materials at constant, predetermined levels for convenient feeding of machines are found in the feeding and receiving Portelvator Pack Lifters illustrated. They are designed for pit installations. Lift load capacity is 2200 lb. Rise is 16 in. from floor level at a speed of 27.5 ipm. Each machine is operated by a ¾ hp motor with reversing magnetic starter pushbutton controlled, and is equipped with a gear driven limit switch. An 8x18 in. operator station is provided on the long side of the 45x48 in. table. Pack Lifters are made in many sizes, with operating features from manual to 100 pct automatic. *Hamilton Tool Co.*

For more data circle No. 36 on postcard, p. 117.

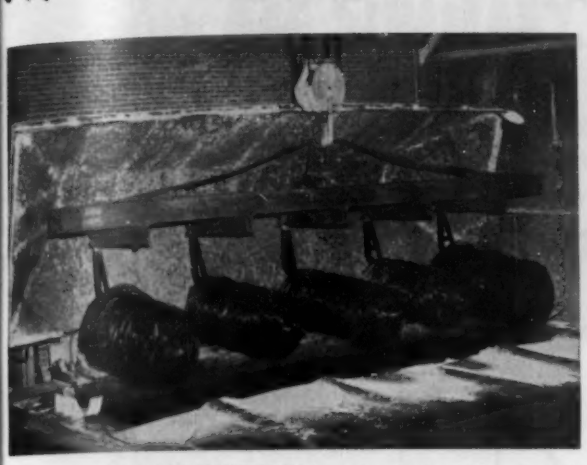
Grinding machine for the jet engine industry

A new precision turning and grinding machine has been developed especially for the jet engine industry, but is applicable to any work on which exceptional tolerances are required on concentricity and parallelism of turned and ground surfaces. Designed to perform multiple operations in one setup, the 3100 Series includes four table sizes, 36, 42, 48 and 52 in., all with a 60-in. swing. Power for driving the work table is provided by a 10 hp dc drive unit, with power transmitted to the table spindle through a timing belt. Infinitely variable electronic potentiometer-controlled table speeds range up to 175 rpm. All radial load on the work spindle pulley is taken on its own bearings, and not transmitted in any way to the table spindle. Horizontal and vertical feeds are hydraulically actuated to provide infinitely variable feed rates and afford smooth fluid motion desirable for finish turning and grinding. *Frauenthal Div., Kaydon Engineering Corp.*

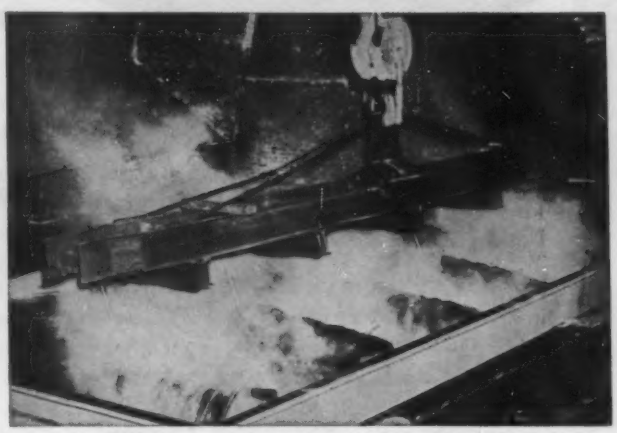
For more data circle No. 37 on postcard, p. 117.

Turn Page

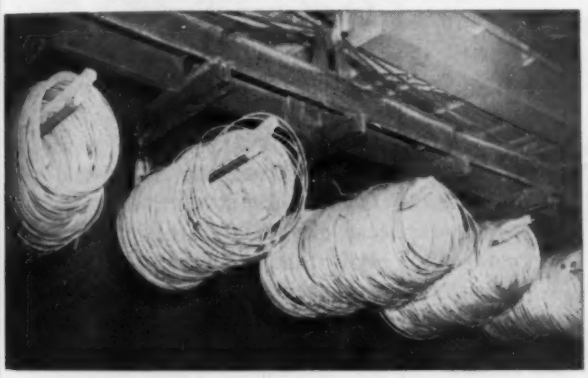
Descaling 5 tons of stainless wire *IN 15 MINUTES* with VIRGO® Descaling Salt



10-MINUTE IMMERSION in molten bath of Virgo Descaling Salt at 900°F. loosens scale. The bath is self-regenerating, and produces no toxic fumes. Immersion time and temperature are flexible, need not be watched closely.



WATER QUENCH removes much of the loose scale. The steam generated by immersing the hot metal in the water further loosens scale by its blasting action. The work is thus prepared for the final acid dip.



THREE-MINUTE DIP in dilute acid removes the now soluble scale. The work is ready for a rinse or hosing to wash off the acid. **Result: a chemically clean surface—no pitting, etching or metal loss.** TOTAL TIME—15 MINUTES.

VIRGO DESCALING SALT—Producers and fabricators of stainless and alloy steels use Virgo Descaling Salt to quickly, positively remove scale produced by hot rolling, forging, extruding, casting, annealing.

VIRGO MOLTEN CLEANER—quickly, positively desands and degraphitizes castings; removes grease, dirt, chemicals, paint, enamel, rubber, atmospheric corrosion and other impurities.

This process can be used on steel; castings; forgings; fabricated parts; material to be salvaged. It employs simple equipment, and is easily adapted to your production methods.

SEND FOR THESE BULLETINS
—Get the whole story on Virgo Descaling Salt and Virgo Molten Cleaner—what they are, how they work, their advantages, how they fit your operations, and the Hooker services you enjoy as a user of the process. Send for these bulletins today.

Hooker Electrochemical Company
33 FORTY-SEVENTH ST., NIAGARA FALLS, N. Y.

Please send me Bulletins checked: Virgo Descaling Salt ☐ Virgo Molten Cleaner ☐

NAME _____

TITLE _____

COMPANY _____

ADDRESS _____

CITY _____ ZONE ____ STATE ____

HOOKER CHEMICALS ®

From the Salt of the Earth

HOOKER ELECTROCHEMICAL COMPANY
33 FORTY-SEVENTH ST., NIAGARA FALLS, N. Y.
NEW YORK, N. Y.
LOS ANGELES, CALIF.
CHICAGO, ILL.
TACOMA, WASH.

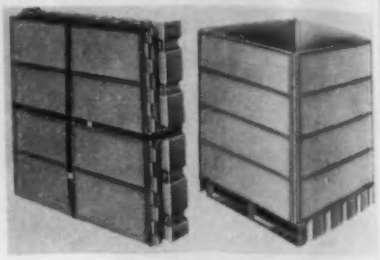
1-1443

—New Equipment—

Continued

Collapsible steel box

Lightweight, collapsible steel box and skid unit for shipping combines the features of strength, lightweight and compactness. The Collaps-a-tainer weighs approximately 100 lb; is constructed of 18 gage



steel with 16 gage reinforcements. Hinged construction permits one man to assemble it in fraction of a minute. Container measures 30x30 x30 in.; pallet 3½ in. clearance. Special stacking feature insures nesting four ways to prevent sliding. Fully collapsed package for returned shipments is a freight saver. *Republic Steel Corp.*

For more data circle No. 38 on postcard, p. 117.

Lift magnet

New lift magnet is powered by a common 6 v automobile battery and can lift 2000 lb of finished steel. It is fast and easy to operate—the operator merely turns a switch. Chain or rope hitches and eyebolts are eliminated. There are no at-

tached cords or wires to restrict length of haul. A recessed control panel contains the operating switch, a dial to indicate the need of recharging and a receptacle for a trickle charger plug. Magnetizing surface is 7x12½ in. Height of unit is 12½ in.; weight, 120 lb. *Sundstrand Magnetic Products Co.*

For more data circle No. 39 on postcard, p. 117.

The Iron Age
FOUNDED 1855

THE IRON AGE SUMMARY...

- Scrap prices advance for sixth week in a row
- But steel market reflects only slight gain
- Strike hedge buying is still a minor factor

The **steelmaking scrap market** continued to kick up its heels this week for the sixth week in a row. Increases raised THE IRON AGE Steel Scrap Composite Price 50¢ a ton to $26.17 per gross ton.

The steel market looks a bit stronger this week, but it still does not fully reflect the bullishness in scrap. This is not surprising, as scrap price increases should be partially discounted as adjustments within that industry. They are not directly or totally related to present and future demand for steel.

While the steel market is very spotty, and the ingot rate is holding steady, the tone of the market is stronger this week. Warehouse demand, which had been flat on its back, has picked up noticeably. This is especially true of larger warehouses and chains.

A check on warehouse sales shows only mild improvement in customers' demand at this retail level. The pickup is attributable partly to progress in inventory correction and perhaps partly to desire of distributors not to let stocks get too low during a period of steel wage contract bargaining.

Mild strike-hedge buying has also been detected in some steel consuming industries including automotive. But this is not yet an important factor in the market. By next month it might be.

Mill inventories of semi-finished steel are in good shape. At least one mill actually pushed up its operating rate to rebuild its inventory of semi-finished after going through a long inventory reduction period. The semi-finished inventory is an ace-in-the-hole in meeting customers' demands for quick delivery.

A surprising portion of mill sales in the past month has been based on meeting delivery promises of 30 days or less. Many deliveries have actually been promised and made within 2 or 3 weeks. Demands for quick delivery are growing rather than diminishing. And steel buyers continue to be very cautious in placing orders.

A series of price reductions was touched off in the Detroit market last Friday when one producer there lowered prices on all its products by $1 a ton. Other Detroit steelmakers quickly matched these reductions, and out-of-area companies began absorbing $1 a ton more freight in order to sell in that area.

Close on the heels of the reductions automotive purchasing agents were testing the market to see if further reductions might be forthcoming. So far none has been. But automotive buyers will undoubtedly step up the pressure.

The price action in the Detroit area is local and is not likely to spread to other areas. The producer that first lowered prices still charges $3 a ton more than producers in Pittsburgh and Chicago for most of his products.

Oil country goods and structurals are still in tightest demand among specific products. Farm buying and construction have boosted some wire and galvanized products.

Steelmaking operations this week are scheduled at 68.5 pct of rated capacity.

Steel Output, Operating Rates

	This Week†	Last Week	Month Ago	Year Ago
Net Tons Produced (000 omitted)	**1,632**	**1,636**	**1,648**	**2,262**
Ingot Production Index (1947—49=100)	**101.6**	**101.8**	**102.6**	**140.8**
District Operating Rates				
Chicago	78.5	80.0	76.0	104.5
Pittsburgh	71.0	73.0*	77.0	100.0
Philadelphia	60.0	60.0	59.5	94.0
Valley	63.0	61.0	62.0	103.0
West	57.5	70.5*	69.5	106.5
Detroit	72.0	73.0	83.0	106.5
Buffalo	67.5	67.5	67.0	94.0
Cleveland	73.0	68.0*	57.0	97.0
Birmingham	56.5	53.5	75.5	101.0
S. Ohio River	74.0	77.0	70.0	89.5
Wheeling	93.0	93.0*	73.0	102.0
St. Louis	72.5	55.5*	62.5	71.0
East	51.0	50.0	50.0	91.0
Aggregate	**68.5**	**68.5**	**68.0**	**99.5**

Per cent of capacity for weeks in 1954 is based on annual capacity of 124,330,410 net tons as of Jan. 1, 1954. Per cent of capacity for last year is based on annual capacity of 117,547,470 tons as of Jan. 1, 1953.

* Revised.

† Tentative.

want prompt dependable delivery of stainless steel bars?

Call any of Crucible's nation-wide warehouses for fast reliable delivery of stainless steel bars. We are well stocked with all sizes, grades and finishes, to meet all your needs.

And when it comes to quality and good machinability characteristics you can't beat Crucible Rezistal Stainless Steels. For Crucible is one of the oldest and most experienced manufacturers of stainless steels — a leading producer of stainless bars.

Whenever you want prompt, dependable delivery of special purpose steels, call Crucible.

Stocks maintained of:

Rex High Speed Steel . . . ALL grades of Tool Steel (including Die Casting and Plastic Die Steel, Drill Rod, Tool Bits and Hollow Drill Steel) . . . Stainless Steel (Sheets, Bars, Wire, Billets, Electrodes) Max-el . . . AISI Alloy, Onyx Spring and Special Purpose Steels

CRUCIBLE first name in special purpose steels

54 years of Fine steelmaking **WAREHOUSE SERVICE**

CRUCIBLE STEEL COMPANY OF AMERICA, GENERAL SALES OFFICES, OLIVER BUILDING, PITTSBURGH, PA.

Branch Offices and Warehouses: ATLANTA • BALTIMORE • BOSTON • BUFFALO • CHARLOTTE • CHICAGO • CINCINNATI • CLEVELAND • DAYTON DENVER • DETROIT • HOUSTON • INDIANAPOLIS • LOS ANGELES • MILWAUKEE • NEWARK • NEW HAVEN • NEW YORK • PHILADELPHIA • PITTSBURGH PROVIDENCE • ROCKFORD • SAN FRANCISCO • SEATTLE • SPRINGFIELD, MASS. • ST. LOUIS • ST. PAUL • SYRACUSE • TORONTO, ONT. • WASHINGTON, D. C.

Markets at a Glance

Republic Boosts Operations . . . Republic Steel Corp. has increased steelmaking operations at three Ohio locations. Resumption of operations at the Massilon plant this week will result in recall of 300 employees, relighting of three openhearths and resumption of blooming mill operations. Pickup in placement of alloy orders for May, June delivery caused reopening of Massilon unit which was shut down Mar. 27. This week Republic's Cleveland plant operating rate is scheduled to hit 77.3 pct following relighting of two openhearths and a blast furnace. Approximately 150 employees have gone back to work. In Canton 350 workers have gone back to their jobs within the past month as the firm put two openhearths and five electrics back into production.

Taconite Boosts Crusher Sales . . . Development of taconite deposits as a source of commercial grade iron ore accounts for about 30 pct of current sales of gyratory crushers. If taconite processing grows from its present 1 million tons annually to an expected 30 million tons, demand for crushers could mushroom 1000 pct.

Cut Export Prices . . . U. S. Steel Export Corp. reports slight reductions in export price base for standard seamless black and galvanized pipe, wire rods, hot-rolled and cold-drawn alloy bars. Prices include freight to New York, Philadelphia and Baltimore and were effective Apr. 22.

Cut Titanium Prices . . . Better cost studies and greater production are again at the root of titanium price reductions, says Titanium Metals Corp. of America. The firm has revised wire and strip prices, effective Apr. 26. Neither was changed in the February cuts by the firm. New wire prices reflect no great changes, while strip prices are down about 12 pct.

Aid For Schuman Nations . . . Funds already appropriated by the government under the amended Mutual Security Act will be the source of the newly-approved $100 million loan to the European Coal and Steel Community. This money, normally administered by Foreign Operations Admin., is to be used primarily to expand and modernize production of coal, coke, and iron ore. Part of loan is for construction of power stations at coal mines and additional housing for miners.

Great Lakes Cuts Prices . . . National Steel Corp. announced last week that due to recent reduction of motor freight rates applying in the principal areas served by its Detroit subsidiary, Great Lakes Steel Corp., reduction of 5¢ per 100 lb has been made in base prices of Great Lakes' products. Other steel producers in the area, Detroit Steel Co., Detroit Tube & Steel Div. of Sharon Steel Corp., Production Steel Strip Co. and McLouth Steel Corp., have met the $5.60 price for cold-rolled strip. McLouth price on hot-rolled sheet and strip is now $4.075 to match Great Lakes'.

Canadian Production Down . . . Rate of production of steel ingots and castings is down more than 30 pct from Canada's record 1953 rate. January 1954 production of castings and ingots amounted to 298,900 net tons, 73.5 pct of rated capacity, compared with 346,648 tons or 103.7 pct for the same period in 1953.

Armco Opens Pipe Plant . . . Full scale production of corrugated metal pipe and pipe arch is now underway at Armco Steel Corp.'s $150,000 plant at Horse Cave, Ky.

Double Wire Sales . . . Republic Steel Corp.'s wire division reported doubled sales of finished wire products in the first quarter of this year over the final quarter of 1953. A company spokesman said that buying by farmers has been responsible for the increase. Company's sales of woven and barb-wire fencing, nails and staples, and baler wire are all up.

Prices At A Glance

(cents per lb unless otherwise noted)

	This Week	Week Ago	Month Ago	Year Ago
Composite prices				
Finished Steel, base	4.634	4.634	4.634	4.376
Pig Iron (gross ton)	$56.59	$56.59	$56.59	$55.26
Scrap, No. 1 hvy (gross ton)	$26.17	$25.67	$24.33	$39.33
Nonferrous				
Aluminum, ingot	21.50	21.50	21.50	20.50
Copper, electrolytic	30.00	30.00	29.875	29.75
Lead, St. Louis	13.80	13.80	13.30	11.80
Magnesium, ingot	27.75	27.75	27.75	27.00
Nickel, electrolytic	63.08	63.08	63.08	63.08
Tin, Straits, N. Y.	97.75	96.25	95.50	96.50
Zinc, E. St. Louis	10.25	10.25	10.25	11.00

Alcoa-Alcan Deal Allowed to Stand

Alcan must offer 110,000 tons annually to independents . . . Takes precedence over Alcoa shipments . . . Alcoa must offer Olin 40,000 tons annually—By *R. L. Hatschek.*

"Constructive conclusion to the last of the outstanding issues between the Dept. of Justice and Alcoa in a litigation which has now been active for 17 years" was Aluminum Co. of America President I. W. Wilson's description of the court decision given last week.

Alcoa is permitted to carry out its contract with Aluminum Co. of Canada for 600,000 tons of aluminum over the 1953-1959 period. Consent of the Justice Dept. was given on the basis of agreements by Alcoa, Alcan and Aluminum Import Corp., an Alcan subsidiary, to make healthy quantities of metal available to non-integrated aluminum users in the U. S.

Provides for Olin . . . Alimport has accepted as a legal obligation the annual offering of 110,000 tons of aluminum to independents until 1959. This is to take precedence to delivery for Alcoa in any times of shortage.

Judge John C. Knox's order also provides that Alcoa must offer to sell to Olin Industries, Inc., all or any part of 40,000 tons of aluminum per year until 1957 and 20,000 tons in 1958.

Breathe Easier . . . Alcoa may further purchase additional quantities from Alcan not exceeding 50,000 tons in any additional year. If Alcoa should wish to purchase more than this tonnage over the original contract the firm must get permission from the Attorney General.

In brief, that is the substance of the order, which was issued on the seventeenth anniversary of the start of the government's antitrust suit against Alcoa. It lifted a huge weight from all parties concerned.

Alcoa's relief comes in that it can now receive the Canadian metal it feels will be needed in the coming year. And the firm's right is now established to make purchases in the future.

Alcan has firmed up a substantial sale. Legality of at least a 600,000-ton market has been confirmed. This puts the big Kitimat development on more solid ground.

And Olin and all other non-integrated fabricators in the U. S. are assured continued availability of primary aluminum.

Top Another High . . . Domestic production of primary aluminum in March, as usual, topped the all-time record with a total of 122,339 tons siphoned from the nation's pots. A new quarterly high was also established as March output brought the total for the first 3 months of 1954 to 349,069 tons.

Tariff Commission Reports . . . Restrictions on imports rather than higher tariffs—may well be the medicine prescribed for the ailing domestic lead and zinc industries.

New congressional interest in the sagging production and sales records of domestic lead and zinc producers is sparked by last week's 550-page report from the U. S. Tariff Commission. After 9 months of investigation, the Federal tariff experts conclude that the existing tariffs on lead and zinc are not effective in restricting imports. But no recommendation nor solution is proposed.

Hot Potato . . . Problem is bound to be a hot issue during the forthcoming congressional debate over President Eisenhower's foreign trade program.

Sen. Henry Dworshak, R., Ida., leads a group of western members who favor imposition of import restrictions rather than boosting tariffs. Plan would restrict lead imports to 335,000 tons annually, and zinc imports to 325,000 tons. These totals would restrict imports to their historical position among the lead and zinc consuming industries. Historically, about one-third of all lead and zinc consumed in the U. S. has been imported.

In contrast, 1953 imports of lead totaled 556,000 tons and zinc imports hit 753,000 tons.

Lead Men Gather . . . Top people in the lead industry got together in Chicago last week for their twenty-sixth annual meeting. In discussions of today's market conditions, a definitely spryer tone was noted. On inventories, estimates placed consumer stocks at about 3 weeks, lowest point since December 1951, while producers hold about 100,000 tons, highest since 1949.

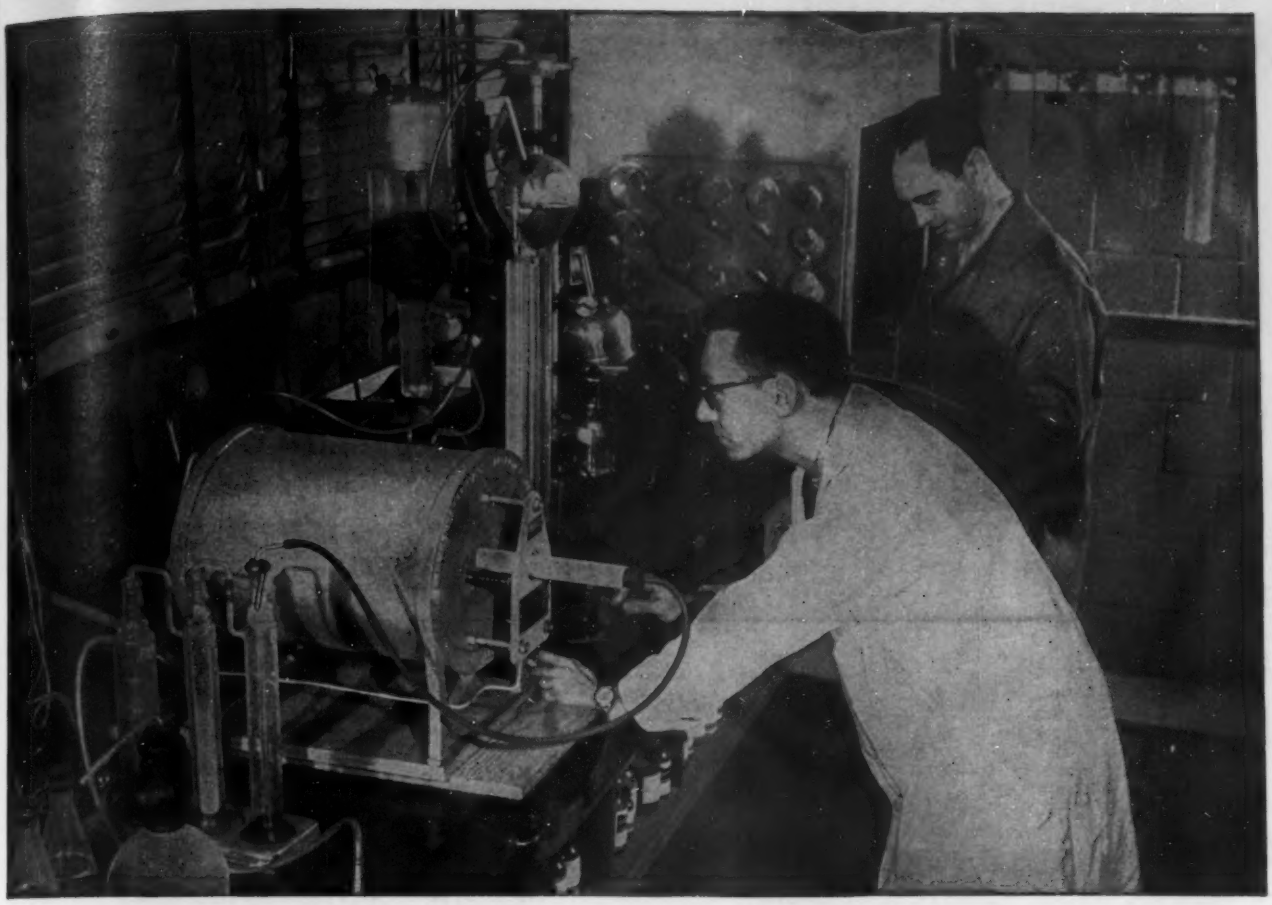
A battery industry spokesman indicated 1954 consumption of lead for his product would about equal to last year's.

NONFERROUS METAL PRICES

(Cents per lb except as noted)

	Apr. 21	Apr. 22	Apr. 23	Apr. 24	Apr. 26	Apr. 27
Copper, electro, Conn.	30.00	30.00	30.00	30.00	30.00	30.00
Copper, Lake, delivered	30.00	30.00	30.00	30.00	30.00	30.00
Tin, Straits, New York	95.00	94.75	95.75	....	97.75	97.75*
Zinc, East St. Louis	10.25	10.25	10.25	10.25	10.25	10.25
Lead, St. Louis	13.80	13.80	13.80	13.80	13.80	13.80

Note: Quotations are going prices
*Tentative



CARBON DETERMINATION

Alloymet 2115

A product of close Metallurgical CONTROL for the production of stainless steel and alloyed iron

From the original formula to the ingot, control is the most important item in our book. *Alloymet 2115* and its companion alloys are products pre-alloyed to take the "headache" out of the melting department. A single trial in your mill will make you an *Alloymet* "regular."

For further information, write us for our booklet, "Master Alloys."

ALTER COMPANY
Alloy Metal Division

1701 Rockingham Road, DAVENPORT, IOWA
Phone 6-2561 Teletype DV 588

Nonferrous Prices

(Effective Apr. 27, 1954)

MILL PRODUCTS

(Cents per lb, unless otherwise noted)

Aluminum

(Base 30,000 lb, f.o.b. ship. pt. frt. allowed)

Flat Sheet: 0.136 in. and thicker, 2S, 3S, 33.9¢; 4S, 36.0¢; 52S, 38.2¢; 24S-O, 24S-OAL, 37.0¢; 75S-O, 75S-OAL, 44.7¢; 0.081-in., 2S, 3S, 35.1¢; 4S, 37.7¢; 52S, 39.9¢; 24S-O, 24S-OAL, 38.4¢; 75S-O, 75S-OAL, 46.9¢; 0.032-in., 2S, 3S, 37.0¢; 4S, 41.8¢; 24S-O, 24S-OAL, 46.9¢; 75S-O, 75S-OAL, 58.4¢.

Plate, ¼-in. and Heavier: 2S-F, 3S-F, 32.4¢; 4S-F, 34.5¢; 52S-F, 36.2¢; 61S-O, 35.6¢; 24S-O, 24S-OAL, 36.9¢; 75S-O, 75S-OAL, 44.3¢.

Extruded Solid Shapes: Shape factors 1 to 5, 36.5¢ to 82.8¢; 12 to 14, 37.2¢ to 99.0¢; 24 to 26, 39.9¢ to $1.29; 36 to 38, 47.2¢ to $1.89.

Rod, Rolled: 1.064 to 4.5-in., 2S-F, 3S-F, 43.8¢ to 37.2¢; cold-finished, 0.375 to 3.449-in., 2S-F, 3S-F, 47.6¢ to 39.3¢.

Screw Machine Stock: Rounds, 11S-T3, ½ to 11/32-in., 59.6¢ to 47.0¢; ⅜ to 1½-in., 46.6¢ to 43.8¢; 1 9/16 to 3-in., 42.7¢ to 39.9¢. Base 6000 lb.

Drawn Wire: Coiled 0.051 to 0.374-in., 2S, 44.1¢ to 32.4¢; 52S, 53.4¢ to 39.1¢; 17S-T4, 60.1¢ to 41.8¢; 61S-T4, 53.9¢ to 41.3¢.

Extruded Tubing: Rounds, 63S-T5, OD 1¼ to 2-in., 31.6¢ to 60.7¢; 2 to 4 in., 37.7¢ to 51.1¢; 4 to 6 in., 38.2¢ to 46.6¢; 6 to 9 in., 38.7¢ to 48.8¢.

Roofing Sheet: Flat, per sheet, 0.032-in., 42¾ x 60 in., $2.838; x 96 in., $4.545; x 120 in., $5.680; x 144 in., $6.816. Coiled sheet, per lb, 0.019 in. x 28 in., 30.8¢.

Magnesium

(F.o.b. mill, freight allowed)

Sheet & Plate: FS1-O ¼ in., 56¢; 3/16 in., 57¢; ⅛ in., 60¢; 0.064 in., 73¢; 0.032 in., 94¢. Specification grade higher. Base 30,000 lb.

Extruded Round Rod: M, diam ¼ to 0.311 in., 77¢; ⅜ to ¾ in., 60.5¢; 1¼ to 1.749 in., 56¢; 2½ to 5 in., 51.5¢. Other alloys higher. Base up to ⅝ in. diam, 10,000 lb; ¾ to 2 in., 20,000 lb; 2 in. and larger, 30,000 lb.

Extruded Solid Shapes: Rectangles: M. In weight per ft, for perimeters less than size indicated; 0.10 to 0.11 lb, 3.5 in., 65.3¢; 0.22 to 0.25 lb, 5.9 in., 62.3¢; 0.50 to 0.59 lb, 8.6 in., 59.7¢; 1.8 to 2.59 lb, 19.5 in., 56.8¢; 4 to 6 lb, 28 in., 52¢. Other alloys higher. Base, in weight per ft of shape: Up to ½ lb, 10,000 lb; ¼ to 1.80 lb, 20,000 lb; 1.80 lb and heavier, 30,000 lb.

Extruded Round Tubing: M, 0.049 to 0.057 in. wall thickness: OD, ¼ to 5/16 in., $1.43; 5/16 to ⅝ in., $1.29; ⅛ to ⅝ in., 96¢; 1 to 2 in., 79¢; 0.165 to 0.219 in. wall; OD, ⅝ to ¾ in., 64¢; 1 to 2 in., 60¢; 3 to 4 in., 59¢. Other alloys higher. Base, OD: Up to 1½ in., 10,000 lb; 1⅛ to 3 in., 20,000 lb; over 3 in., 30,000 lb.

Titanium

(10,000 lb base, f.o.b. mill)

Commercially pure and alloy grades; Sheets and strip, HR or CR, $15; Plate, HR, $12; Wire, rolled and/or drawn, $11; Bar, HR or forged, $6; Forgings, $6.

Nickel, Monel, Inconel

(Base prices, f.o.b. mill)

	"A" Nickel	Monel	Inconel
Sheet, CR	86½	67½	92½
Strip, CR	92½	70½	98½
Rod, bar	82½	65½	88½
Angles, HR	82½	65½	88½
Plate, HR	84½	66½	90½
Seamless Tube	115½	100½	137½
Shot, blocks	....	60	....

Copper, Brass, Bronze

(Freight included on 500 lb)

	Sheet	Rods	Extruded Shapes
Copper	46.41	....	48.48
Copper, h-r	43.38	44.73	....
Copper, drawn	....	45.98	....
Low brass	44.47	44.41	....
Yellow brass	41.72	41.66	....
Red brass	45.44	45.38	....
Naval brass	45.76	40.07	41.33
Leaded brass	....	....	39.11
Com. bronze	46.95	46.89	....
Mang. bronze	49.48	43.62	45.18
Phos. bronze	66.58	67.08	....
Muntz metal	43.96	39.77	41.02
Ni silver, 10 pct	55.36	....	62.63

PRIMARY METALS

(Cents per lb, unless otherwise noted)

Aluminum ingot, 99+%, 10,000 lb, freight allowed	21.50
Aluminum pig	20.00
Antimony, American, Laredo, Tex.	25.50
Beryllium copper, per lb cont'd Be	$40.00
Beryllium aluminum 5% Be, Dollars per lb contained Be	$72.75
Bismuth, ton lots	$2.25
Cadmium, del'd	$1.70
Cobalt, 97-99% (per lb)	$2.60 to $2.67
Copper, electro, Conn. Valley	30.00
Copper, Lake, delivered	30.00
Gold, U. S. Treas., dollars per oz.	$35.00
Indium, 99.8%, dollars per troy oz.	$2.25
Iridium, dollars per troy oz.	$165 to $175
Lead, St. Louis	13.80
Lead, New York	14.00
Magnesium 99.8+%, f.o.b. Freeport, Tex., 10,000 lb, pig	27.00
Ingot	27.75
Magnesium, sticks, 100 to 500 lb.	46.00 to 48.00
Mercury, dollars per 76-lb flask, f.o.b. New York	$228 to $231
Nickel electro, f.o.b. N. Y. warehouse	63.08
Nickel oxide sinter, at Copper Creek, Ont., contained nickel	56.25
Palladium, dollars per troy oz.	$21.00
Platinum, dollars per troy oz.	$84 to $87
Silver, New York, cents per oz.	85.25
Tin, New York	97.75
Titanium, sponge, grade A-1	$4.72
Zinc, East St. Louis	10.25
Zinc, New York	10.75
Zirconium copper, 50 pct	$6.20

REMELTED METALS

Brass Ingot

(Cents per lb delivered carloads)

85-5-5-5 ingot	
No. 115	26.00
No. 120	25.25
No. 123	24.75
80-10-10 ingot	
No. 305	31.00
No. 315	28.75
88-10-2 ingot	
No. 210	40.75
No. 215	37.25
No. 245	32.25
Yellow ingot	
No. 405	22.25
Manganese bronze	
No. 421	26.75

Aluminum Ingot

(Cents per lb del'd 30,000 lb and over)

95-5 aluminum-silicon alloys	
0.30 copper, max.	23.25-24.00
0.60 copper, max.	23.00-23.75
Piston alloys (No. 122 type)	21.00-23.00
No. 12 alum. (No. 2 grade)	20.50-21.00
108 alloy	20.50-21.50
195 alloy	22.00-22.75
13 alloy (0.60 copper max.)	23.00-23.75
ASX-679	20.50-21.50

Steel deoxidizing aluminum, notch-bar granulated or shot

Grade 1—96-97½%	21.50-22.50
Grade 2—92-95%	20.50-21.50
Grade 3—90-92%	19.00-19.50
Grade 4—85-90%	18.00-18.50

ELECTROPLATING SUPPLIES

Anodes

(Cents per lb, freight allowed, 5000 lb lots)

Copper	
Cast, oval, 15 in. or longer	44.54
Electrodeposited	38.38
Flat rolled	47.14
Brass, 80-20	
Cast, oval, 15 in. or longer	43.515
Zinc, flat cast	20.25
Ball, anodes	18.50
Nickel, 99 pct plus	
Cast	84.00
Cadmium	$1.75
Silver 999 fine, rolled, 100 oz. lots per troy oz., f.o.b. Bridgeport, Conn.	94⅛

Chemicals

(Cents per lb, f.o.b. shipping points)

Copper cyanide, 100 lb drum	63.90
Copper sulfate, 99.5 crystals, bbl.	12.85
Nickel salts, single or double, 4-100 lb bags, frt. allowed	30.00
Nickel chloride, 375 lb drum	38.00
Silver cyanide, 100 oz. lots, per oz.	75½
Sodium cyanide, 96 pct domestic 200 lb drums	19.25
Zinc cyanide, 100 lb drum	54.30

SCRAP METALS

Brass Mill Scrap

(Cents per pound, add 1¢ per lb for shipments of 20,000 lb and over)

	Heavy	Turnings
Copper	26	25¼
Yellow brass	19¾	18
Red brass	23	22¼
Comm. bronze	23⅞	23⅛
Mang. bronze	18¼	17⅛
Yellow brass rod ends	19½	....

Custom Smelters' Scrap

(Cents per pound carload lots, delivered to refinery)

No. 1 copper wire	26¼—26½
No. 2 copper wire	24¾—25
Light copper	23¾—24⅛
*Refinery brass	21½—22

* Dry copper content.

Ingot Makers' Scrap

(Cents per pound carload lots, delivered to refinery)

No. 1 copper wire	26¼—26½
No. 2 copper wire	24¾—25
Light copper	23¾—24
No. 1 composition	20
No. 1 comp. turnings	19½
Rolled brass	16
Brass pipe	17
Radiators	16
Aluminum	
Mixed old cast	12½—13
Mixed new clips	14 —14½
Mixed turnings, dry	13 —13⅛
Pots and pans	12½—13

Dealers' Scrap

(Dealers' buying price, f.o.b. New York in cents per pound)

Copper and Brass	
No. 1 heavy copper and wire	24
No. 2 heavy copper and wire	22½—22¾
Light copper	20½—20¾
New type shell cuttings	20½
Auto radiators (unsweated)	14 —14½
No. 1 composition	18
No. 1 composition turnings	17½
Unlined red car boxes	15½—16
Cocks and faucets	15½—16
Mixed heavy yellow brass	12½
Old rolled brass	14½—15
Brass pipe	16¼—16½
New soft brass clippings	17½
Brass rod ends	15½
No. 1 brass rod turnings	14½
Aluminum	
Alum. pistons and struts	7 — 8
Aluminum crankcases	10½—11
2S aluminum clippings	13 —13½
Old sheet and utensils	10½—11
Borings and turnings	6 — 7
Misc. cast aluminum	10½—11
Dural clips (24S)	11 —11½
Zinc	
New zinc clippings	5½— 6
Old zinc	4½— 4½
Zinc routings	2½— 2¾
Old die cast scrap	3½— 3¾
Nickel and Monel	
Pure nickel clippings	60 —65
Clean nickel turnings	40
Nickel anodes	60 —65
Nickel rod ends	60 —65
New Monel clippings	22 —24
Clean Monel turnings	14 —15
Old sheet Monel	20 —22
Nickel silver clippings, mixed	13
Nickel silver turnings, mixed	11
Lead	
Soft scrap lead	11 —11¼
Battery plates (dry)	5¾— 6
Batteries, acid free	4¼
Magnesium	
Segregated solids	20 —21
Castings	19 —20
Miscellaneous	
Block tin	75 —80
No. 1 pewter	55 —60
No. 1 auto babbitt	45 —48
Mixed common babbitt	12½—13
Solder joints	16½
Siphon tops	45
Small foundry type	15¼—15½
Monotype	13¾—14
Lino. and stereotype	13 —13¼
Electrotype	11¼—11½
Hand picked type shells	8 — 8½
Lino. and stereo. dross	5¼— 5½
Electro dross	3½— 4

"Sure, I'm Top Brass– and mighty proud of it, too!"

The Brass

The new doorknobs on the Pentagon are brass, and GIs who recall the frosty remarks of some high ranking officers about their use of the term will get many a chuckle out of the change.

The old hardware on the main entrances was cast iron but it was rusting away and the building managers were reported to have received complaints about broken fingernails from some of the personnel. Since a taut military organization can't handle paperwork properly or even stand a passable inspection, on or off duty, under such conditions, we think the change is all for the better.

But we never could see the objection to the word "brass" as applied to the higher military echelon by those of lower rank. The term not only has a ring of authority to it, there is even good authority for its use. It comes from "brass hat" and Webster tells us that this means "a general or staff officer; — from the ornamental gold braid on the cap. *Slang.*" So those who want to try to stop use of the term must first stop using brass all over themselves and leave it for the doorknobs.

Even so some other descriptive terms will come about. A little poke at pomp and circumstance is part of a citizen military establishment. Any soldier who laughs at himself as nothing but "government issue" along with the guns and rations is not going to stop there.

Further, if the present GIs indulge in the same unrestrained nomenclature we remember, ranking officers ought to be happy to settle quickly for just brass.

Editorial from the WALL STREET JOURNAL

BRASS *opens the door to the solution of countless problems in fabrication and use. And Bristol has an exceptional record of 104 years as a dependable supplier of top-quality strip, wire, and rod. In fact—*

"Bristol-Fashion" means **Brass at its Best**

THE BRISTOL BRASS CORP., BRISTOL, CONN. OFFICES OR WAREHOUSES IN PRINCIPAL CITIES

Did Low Prices Dry Up Scrap Sources?

Recent activity recalls predictions that low prices were halting collections . . . Some brokers hard put to fill orders . . . Export order boosts prices across New York State.

Iron and steel scrap prices continued to advance in most areas this week. Steelmaking grades showed the greatest increase in most districts, but cast and rails also strengthened.

Predictions by the trade that any tonnage buying would force prices up now seem to have been confirmed.

The conclusion is inescapable that depressed prices this winter dried up normal supply channels. One New York broker has gone as far afield as Buffalo for No. 1 heavy smelting for export. And he's offering $2 above previous prices, had no takers at press time.

Other areas report shortages in various items. The cast situation around Birmingham is particularly bad, as scrap collectors stopped making their rounds because of low return. New attention is being paid to turnings in several areas as mills try for higher hot metal yield without lighting more blast furnaces.

THE IRON AGE Steel Scrap Composite continued to rise this week, increasing 50¢ to $26.17.

Pittsburgh—The market assumed a stronger tone although activity within the district is limited. Openhearth material moved up $1 per ton as dealer resistance stiffened. An independent consumer reportedly paid $30 per ton for No. 1 heavy melting from New England. Strength in adjoining markets is another factor in the picture. Blast furnace grades and are firming.

Chicago—A note of caution entered market buying this week, though prices continued to creep up. Buying was growing short, and there was some opinion that the market would level in another week with about $1 more increase before slowing down. This despite new mill sales at better prices, though in small quantity. The No. 2 dealer bundle situation has improved considerably.

Philadelphia—Scrap in this major market continues to dodder along with no basic change. Steelmaking scrap prices continued at unchanged levels and predictions as to when a change for the better might come became more pessimistic. Even the blowing out of a blast furnace by one steel producer didn't bring much optimism as long as the steel production rate continues lower than the national average.

New York — Steelmaking grades moved up $2 on the basis of some out-of-district sales and broker inquiries for export orders. Areas as far away as Buffalo confirmed firm offers by New York traders to buy No. 1 steel at $2 above previous quotations. But dealers were hard put to lay their hands on No. 1, were cautious about commitments. In addition to exports, mill buying has perked up. In an unusual move, some scrap was trucked to Pittsburgh mills.

Detroit—The question here is what constitutes the market. Is it the good prices that are being paid for small tonnages here and there or is it the low level that the dealer has to sell at to move any significant tonnage? Any increases reflect the influence of these small purchases and a stiffening on the part of dealers.

Cleveland—While there were no price changes except in cast here this week, the market continued firm. At press time most dealers were waiting to see what lists would bring. Brokers seemed confident mills would buy both heavy melting and turnings in near future. Machinery cast and stove plate went up $1 to $42 and $35 respectively.

Birmingham—Southern steel mills have not yet followed other sections in increasing scrap prices, but brokers say the market is showing signs of strengthening. Dealers still are refusing to fill orders for nearly all grades of scrap at present prices and some small consumers in the area, unable to get cast at present prices, are reported paying a premium for it. However, the amounts purchased are too small to establish a market. Some brokers say they are paying what they get for cast and in some instances more in order to fill orders.

St. Louis—Renewed interest is being shown in some items such as turnings, rails of all kinds, which are in short supply, and in cast grades. Some prices are rising. Railroads are getting $1 more for spring steel.

Cincinnati — Closing of industrial lists this week was expected to lend strength to openhearth grades. Market generally entered end of the month quiet as local buyers awaited issuance of May buying prices in adjoining areas. Most brokers expect to see at least a $1 increase in most grades next month.

Boston—Stronger sentiment is here —but brokers are still waiting for some new business to match it. Steelmaking grades and a few cast items were quoted higher this week while mixed borings and turnings was the only grade to slip in price.

Buffalo—The export inquiry from the East Coast boosted the price of No. 1 heavy melting here $2 a ton with no takers. The inquiry was also reported in mid-state. Meanwhile local buying interest remained at low ebb for steelmaking and blast furnace grades. Dealers reported heavy yard stock and were cautiously viewing strength in other markets. New buying was reported in cast grades at current levels.

West Coast—Market continued listless with no price changes in sight on steelmaking grades. Only one major buyer remains in market and others have sufficient inventory for up to 3 months at present rate of operations. Increased use of hot metal in integrated plants continues to keep consumption below average for rate of operations.

Scrap Prices

(Effective Apr. 27, 1954)

Pittsburgh

No. 1 hvy. melting	$27.00 to $28.00
No. 2 hvy. melting	25.00 to 26.00
No. 1 bundles	27.00 to 28.00
No. 2 bundles	23.00 to 24.00
Machine shop turn.	14.00 to 15.00
Mixed. bor. and ms. turns.	14.00 to 15.00
Shoveling turnings	18.00 to 19.00
Cast iron borings	18.00 to 19.00
Low phos. punch'gs, plate	31.00 to 32.00
Cut str'ct'r'ls, 3 ft & under	31.00 to 32.00
Heavy turnings	25.00 to 26.00
No. 1 RR. hvy. melting	30.00 to 31.00
Scrap rails, random lgth.	37.00 to 38.00
Rails 2 ft and under	43.00 to 44.00
RR. steel wheels	34.00 to 35.00
RR. spring steel	34.00 to 35.00
RR. couplers and knuckles	34.00 to 35.00
No. 1 machinery cast.	42.00 to 43.00
Cupola cast.	36.00 to 37.00
Heavy breakable cast.	30.00 to 31.00

Chicago

No. 1 hvy. melting	$29.00 to $30.00
No. 2 hvy. melting	27.00 to 28.00
No. 1 factory bundles	30.00 to 32.00
No. 1 dealers' bundles	29.00 to 31.00
No. 2 dealers' bundles	21.00 to 23.00
Machine shop turn.	13.50 to 14.00
Mixed bor. and turn.	13.50 to 14.00
Shoveling turnings	15.50 to 16.00
Cast iron borings	15.50 to 16.00
Low phos. forge crops	36.00 to 38.00
Low phos. punch'gs, plate	33.00 to 34.00
Low phos. 3 ft and under	32.00 to 33.00
No. 1 RR. hvy. melting	31.00 to 33.00
Scrap rails, random lgth.	34.00 to 36.00
Rerolling rails	40.00 to 42.00
Rails 2 ft and under	43.00 to 44.50
Locomotive tires, cut	34.00 to 35.00
Cut bolsters & side frames	36.00 to 37.00
Angles and splice bars	37.00 to 38.00
RR. steel car axles	39.00 to 40.00
RR. couplers and knuckles	34.00 to 35.00
No. 1 machinery cast.	40.00 to 42.00
Cupola cast.	37.00 to 39.00
Heavy breakable cast.	31.00 to 32.00
Cast iron brake shoes	36.00 to 37.00
Cast iron car wheels	34.00 to 35.00
Malleable	40.00 to 42.00
Stove plate	31.00 to 33.00

Philadelphia Area

No. 1 hvy. melting	$21.00 to $22.00
No. 2 hvy. melting	19.00 to 20.00
No. 1 bundles	21.00 to 22.00
No. 2 bundles	17.00 to 18.00
Machine shop turn.	10.00 to 11.00
Mixed bor. short turn.	10.00 to 11.00
Cast iron borings	10.00 to 11.00
Shoveling turnings	15.00 to 16.00
Clean cast chem. borings.	24.00 to 25.00
Low phos. 5 ft and under	24.00 to 26.00
Low phos. 2 ft and under	25.00 to 27.00
Low phos. punch'gs	25.00 to 27.00
Elec. furnace bundles	23.00 to 24.00
Heavy turnings	20.00 to 21.00
RR. steel wheels	29.00 to 30.00
RR. spring steel	29.00 to 30.00
Rails 18 in. and under	39.00 to 40.00
Cupola cast.	34.00 to 36.00
Heavy breakable cast.	35.50 to 36.50
Cast iron carwheels	38.00 to 39.00
Malleable	38.00 to 39.00
Unstripped motor blocks.	27.00 to 28.00
No. 1 machinery cast.	39.00 to 40.00
Charging box cast.	36.00 to 37.00

Cleveland

No. 1 hvy. melting	$25.00 to $26.00
No. 2 hvy. melting	22.00 to 23.00
No. 1 bundles	25.00 to 26.00
No. 2 bundles	19.00 to 20.00
No. 1 busheling	25.00 to 26.00
Machine shop turn.	11.00 to 12.00
Mixed bor. and turn.	14.50 to 15.50
Shoveling turnings	14.50 to 15.50
Cast iron borings	14.50 to 15.50
Cut struct'r'l plate, 2 ft & under	31.50 to 32.50
Drop forge flashings	25.00 to 26.00
Low phos. 2 ft & under	26.00 to 27.00
No. 1 RR. heavy melting	27.00 to 28.00
Rails 3 ft and under	43.00 to 44.00
Rails 18 in. and under	44.00 to 45.00
Railroad grate bars	27.00 to 28.00
Steel axle turnings	19.00 to 20.00
Railroad cast.	39.00 to 40.00
No. 1 machinery cast.	41.00 to 42.00
Stove plate	34.00 to 35.00
Malleable	39.00 to 40.00

Iron and Steel Scrap

Going prices of iron and steel scrap as obtained in the trade by THE IRON AGE based on representative tonnages. All prices are per gross ton delivered to consumer unless otherwise noted.

Youngstown

No. 1 hvy. melting	$29.00 to $30.00
No. 2 hvy. melting	24.00 to 25.00
No. 1 bundles	29.00 to 30.00
No. 2 bundles	22.00 to 23.00
Machine shop turn.	12.00 to 13.00
Shoveling turnings	17.50 to 18.50
Cast iron borings	17.50 to 18.50
Low phos. plate	31.00 to 32.00

Buffalo

No. 1 hvy. melting	$25.00 to $26.00
No. 2 hvy. melting	19.50 to 20.50
No. 1 busheling	23.00 to 24.00
No. 1 bundles	25.00 to 26.00
No. 2 bundles	17.50 to 18.50
Machine shop turn.	14.00 to 14.50
Mixed bor. and turn.	16.50 to 17.00
Shoveling turnings	17.50 to 18.00
Cast iron borings	16.50 to 17.00
Low phos. plate	27.00 to 28.00
Scrap rails, random, lgth.	33.00 to 34.00
Rails 2 ft and under	40.00 to 41.00
RR. steel wheels	34.00 to 35.00
RR. spring steel	34.00 to 35.00
RR. couplers and knuckles	34.00 to 35.00
No. 1 machinery cast.	39.00 to 40.00
No. 1 cupola cast.	36.00 to 37.00

Detroit

Brokers buying prices per gross ton, on cars:

No. 1 hvy. melting	$18.00 to $19.00
No. 2 hvy. melting	14.00 to 15.00
No. 1 bundles, openhearth	17.50 to 18.50
No. 2 bundles	14.00 to 15.00
New busheling	16.00 to 17.00
Drop forge flashings	16.00 to 17.00
Machine shop turn.	7.00 to 8.00
Mixed bor. and turn.	9.00 to 10.00
Shoveling turnings	9.00 to 10.00
Cast iron borings	9.00 to 10.00
Low phos. punch's, plate	17.00 to 18.00
No. 1 cupola cast.	35.00
Heavy breakable cast.	24.00
Stove plate	28.00
Automotive cast.	35.00

St. Louis

No. 1 hvy. melting	$25.00 to $26.00
No. 2 hvy. melting	24.25 to 25.25
No. 1 bundles	25.00 to 26.00
No. 2 bundles	19.50 to 20.50
Machine shop turn.	11.00 to 12.00
Cast iron borings	12.00 to 13.00
Shoveling turnings	13.00 to 14.00
No. 1 RR. hvy. melting	29.00 to 30.00
Rails, random lengths	37.00 to 38.00
Rails, 18 in. and under	39.00 to 40.00
Locomotive tires, uncut	29.00 to 30.00
Angles and splice bars	30.50 to 32.00
Std. steel car axles	35.00 to 36.00
RR. spring steel	32.50 to 33.50
Cupola cast.	39.00 to 40.00
Hvy. breakable cast.	27.00 to 28.00
Cast iron brake shoes	30.00 to 31.00
Stove Plate	34.00 to 35.00
Cast iron car wheels	30.00 to 31.00
Malleable	34.00 to 35.00
Unstripped motors blocks	27.00 to 28.00

New York

Brokers buying prices per gross ton, on cars:

No. 1 hvy. melting	$14.00 to $16.00
No. 2 hvy. melting	13.00 to 14.00
No. 2 bundles	11.00 to 12.00
Machine shop turn.	5.00 to 6.00
Mixed bor. and turn.	7.00 to 8.00
Shoveling turnings	8.00 to 9.00
Clean cast chem. borings.	18.00 to 19.00
No. 1 machinery cast.	35.00 to 36.00
Mixed yard cast.	29.00 to 30.00
Charging box cast.	29.00 to 30.00
Heavy breakable cast.	29.00 to 30.00
Unstripped motor blocks.	22.00 to 23.00

Birmingham

No. 1 hvy. melting	$20.00
No. 2 hvy. melting	18.00
No. 1 bundles	20.00
No. 2 bundles	$15.00 to 16.00
No. 1 busheling	20.00
Machine shop turn.	13.00
Shoveling turnings	15.00
Cast iron borings	13.00 to 14.00
Electric furnace bundles	25.00 to 26.00
Bar crops and plate	28.00 to 29.00
Structural and plate, 2 ft	28.00 to 29.00
No. 1 RR. hvy. melting	24.00 to 25.00
Scrap rails, random lgth.	32.00 to 33.00
Rails, 18 in. and under	37.00 to 38.00
Angles & splice bars	35.00 to 36.00
Rerolling rails	33.00 to 34.00
No. 1 cupola cast.	40.00 to 41.00
Stove plate	37.00 to 38.00
Cast iron car wheels	33.00 to 34.00
Charging box cast.	33.00 to 34.00
Heavy breakable	24.00 to 25.00
Unstripped motor blocks.	31.00 to 32.00
Mashed tin cans	14.00 to 15.00

Boston

Brokers buying prices per gross ton, on cars:

No. 1 hvy. melting	$16.00
No. 2 hvy. melting	13.00
No. 1 bundles	$14.00 to 15.00
No. 2 bundles	11.00
No. 1 busheling	13.50 to 14.50
Elec. furnace, 3 ft & under	16.00
Machine shop turn.	1.00 to 1.50
Mixed bor. and short turn.	6.00 to 6.50
Shoveling turnings	7.00 to 7.50
Clean cast chem. borings.	13.00 to 14.00
No. 1 machinery cast.	27.00 to 29.00
Mixed cupola cast.	25.00 to 26.00
Heavy breakable cast.	25.00 to 25.50
Stove plate	23.00 to 24.00
Unstripped motor blocks.	7.00 to 8.00

Cincinnati

Brokers buying prices per gross ton, on cars:

No. 1 hvy. melting	$23.00 to $24.00
No. 2 hvy. melting	20.00 to 21.00
No. 1 bundles	23.00 to 24.00
No. 2 bundles	17.00 to 18.00
Machine shop turn.	10.00 to 11.00
Mixed bor. and turn.	11.00 to 11.50
Shoveling turnings	13.00 to 14.00
Cast iron borings	11.00 to 11.50
Low phos., 18 in. & under	31.00 to 32.00
Rails, random lengths	35.00 to 36.00
Rails, 18 in. and under	43.00 to 44.00
No. 1 cupola cast.	35.00 to 36.00
Hvy. breakable cast.	32.00 to 33.00
Drop broken cast.	42.00 to 43.00

San Francisco

No. 1 hvy. melting	$20.00
No. 2 hvy. melting	16.00
No. 1 bundles	19.00
No. 2 bundles	16.00
No. 3 bundles	12.00
Machine shop turn.	5.00
Cast iron borings	9.00
No. 1 RR. hvy. melting	23.00
No. 1 cupola cast.	$39.00 to 40.00

Los Angeles

No. 1 hvy. melting	$20.00
No. 2 hvy. melting	16.00
No. 1 bundles	17.00
No. 2 bundles	16.00
No. 3 bundles	12.00
Machine shop turn.	5.00
Shoveling turnings	$7.00 to 9.00
Cast iron borings	7.00 to 9.00
Elec. fur. 1 ft and under.	25.00
No. 1 RR. hvy. melting	20.00
No. 1 cupola cast.	37.00 to 38.00

Seattle

No. 1 hvy. melting	$23.00
No. 2 hvy. melting	19.00
No. 1 bundles	22.00
No. 2 bundles	16.00
No. 3 bundles	12.00
No. 1 cupola cast.	37.00
Mixed yard cast.	35.00

Hamilton, Ont.

No. 1 hvy. melting	$22.00
No. 2 hvy. melting	19.00
No. 1 bundles	22.00
No. 2 bundles	19.00
Mixed steel scrap	16.00
Bushelings	17.00
Bush., new fact prep'd.	20.00
Bush., new fact unprep'd.	16.00
Short steel turnings	12.00
Mixed bor. and turn.	12.00
Rails, remelting	31.00
Cast scrap	$42.00 to 45.00

Chaucer's Sheffield Whittle

In 14th Century England, Sheffield was already famous for its fine cutlery. Geoffrey Chaucer, diplomat, business man and renowned poet, wrote of the "Sheffield Whittle" as being in common use — more than six hundred years ago.

Today, knives for "whittling," for industry, for agriculture, for the military, are required in millions of units—just one of the nation's numerous demands for steel. To fulfill these demands, a never failing flow of scrap is indispensable.

For the purchase or sale of iron or steel scrap...

phone or write "Your Chicago Broker"

M.S. KAPLAN COMPANY

231 S. La Salle St., Chicago

Telephone ANdover 3-3900

Comparison of Prices

(Effective Apr. 27, 1954)

Steel prices on this page are the average of various f.o.b. quotations of major producing areas: Pittsburgh, Chicago, Gary, Cleveland, Youngstown.

Price advances over previous week are printed in Heavy Type; declines appear in *Italics*.

	Apr. 27 1954	Apr. 20 1954	Mar. 30 1954	Apr. 28 1953
Flat-Rolled Steel: (per pound)				
Hot-rolled sheets	3.925¢	3.925¢	3.925¢	3.775¢
Cold-rolled sheets	4.775	4.775	4.775	4.575
Galvanized sheets (10 gn.)	5.275	5.275	5.275	5.075
Hot-rolled strip	3.925	3.925	3.925	3.725
Cold-rolled strip	5.513	5.513	5.513	5.20
Plate	4.10	4.10	4.10	3.90
Plates wrought iron	9.30	9.30	9.30	9.00
Stainl's C-R strip (No. 302)	41.50	41.50	41.50	38.48
Tin and Terneplate: (per base box)				
Tinplate (1.50 lb.) cokes	$8.95	$8.95	$8.95	$8.95
Tinplate, electro (0.50 lb.)	7.65	7.65	7.65	7.65
Special coated mfg. terns	7.75	7.75	7.75	7.75
Bars and Shapes: (per pound)				
Merchant bars	4.16¢	4.16¢	4.16¢	3.95¢
Cold finished bars	5.20	5.20	5.20	4.925
Alloy bars	4.875	4.875	4.875	4.675
Structural shapes	4.10	4.10	4.10	3.85
Stainless bars (No. 302)	35.50	35.50	35.50	32.98
Wrought iron bars	10.40	10.40	10.40	10.05
Wire: (per pound)				
Bright wire	5.525¢	5.525¢	5.525¢	5.225¢
Rails: (per 100 lb.)				
Heavy rails	$4.325	$4.325	$4.325	$3.775
Light rails	5.20	5.20	5.20	4.25
Semifinished Steel: (per net ton)				
Rerolling billets	$62.00	$62.00	$62.00	$59.00
Slabs, rerolling	62.00	62.00	62.00	59.00
Forging billets	75.50	75.50	75.50	70.50
Alloy blooms, billets, slab	82.00	82.00	82.00	76.00
Wire Rod and Skelp: (per pound)				
Wire rods	4.525¢	4.525¢	4.525¢	4.325¢
Skelp	3.75	3.75	3.75	3.55
Finished Steel Composite: (per pound)				
Base price	4.634¢	4.634¢	4.634¢	4.376¢

	Apr. 27 1954	Apr. 20 1954	Mar. 30 1954	Apr. 28 1953
Pig Iron: (per gross ton)				
Foundry, del'd Phila.	$61.19	$61.19	$61.19	$60.69
Foundry, Valley	56.50	56.50	56.50	55.00
Foundry, Southern, Cin'ti	60.43	60.43	60.43	58.93
Foundry, Birmingham	52.88	52.88	52.88	51.38
Foundry, Chicago	56.50	56.50	56.50	55.00
Basic del'd, Philadelphia	60.27	60.27	60.27	59.77
Basic, Valley furnace	56.00	56.00	56.00	54.50
Malleable, Chicago	56.50	56.50	56.50	55.00
Malleable, Valley	56.50	56.50	56.50	55.00
Ferromanganese‡, cents per lb.	10.00¢	10.00¢	10.00¢	8.00¢
‡ 76 pct Mn base.				
Pig Iron Composite: (per gross ton)				
Pig iron	$56.59	$56.59	$56.59	$55.26
Scrap: (per gross ton)				
No. 1 steel, Pittsburgh	$27.50	$26.50	$25.50	$39.50
No. 1 steel, Phila. area	21.50	21.50	21.50	41.50
No. 1 steel, Chicago	29.50	29.00	26.00	37.00
No. 1 bundles, Detroit	18.00	18.00	16.50	40.25
Low phos., Youngstown	31.50	31.50	27.50	47.50
No. 1 mach'y cast, Pittsburgh	42.50	42.50	41.50	49.50
No. 1 mach'y cast, Philadel'a	39.50	39.50	38.50	47.50
No. 1 mach'y cast, Chicago	41.00	39.50	37.00	44.50
Steel Scrap Composite: (per gross ton)				
No. 1 heavy melting scrap	$26.17	$25.67	$24.33	$39.33
Coke, Connellsville: (per net ton at oven)				
Furnace coke, prompt	$14.38	$14.38	$14.38	$14.75
Foundry coke, prompt	16.75	16.75	16.75	17.75
Nonferrous Metals: (cents per pound to large buyers)				
Copper, electrolytic, Conn.	30.00	30.00	29.875‡	29.75‡
Copper, Lake, Conn.	30.00	30.00	30.00	....
Tin, Straits, New York	97.75†	96.25*	95.50	96.50
Zinc, East St. Louis	10.25	10.25	10.25	11.00
Lead, St. Louis	13.80	13.80	13.80	11.80
Aluminum, virgin ingot	21.50	21.50	21.50	20.50
Nickel, electrolytic	63.08	63.08	63.08	63.08
Magnesium, ingot	27.75	27.75	27.75	27.00
Antimony, Laredo, Tex.	28.50	28.50	28.50	34.50

† Tentative. ‡ Average. * Revised.

Finished Steel Composite

Weighted index based on steel bars, shapes, plates, wire, rails, black pipe, hot and cold rolled sheets and strips.

Pig Iron Composite

Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Birmingham.

Steel Scrap Composite

Average of No. 1 heavy melting steel scrap delivered to consumers at Pittsburgh, Philadelphia and Chicago.

PIG IRON

Dollars per gross ton, f.o.b., subject to switching charges.

Producing Point	Basic	Fdry.	Mall.	Bess.	Low Phos.
Bethlehem *B3*	58.00	58.50	59.00	59.50	.....
Birmingham *R3*	52.38	52.88	.....	.....	.....
Birmingham *W9*	52.38	52.88	.....	.....	.....
Birmingham *S5*	52.38	52.88	.....	.....	.....
Buffalo *R3*	56.00	56.50	57.00	.....	.....
Buffalo *H1*	56.00	56.50	57.00	.....	.....
Buffalo *W6*	56.00	56.50	57.00	.....	.....
Chicago *I4*	56.00	56.50	56.50	57.00	.....
Cleveland *A5*	56.00	56.50	56.50	57.00	61.00
Cleveland *R3*	56.00	56.50	56.50	.....	.....
Daingerfield *L3*	52.50	52.50	52.50	.....	.....
Duluth *I4*	56.00	56.50	56.50	57.00	.....
Erie *I4*	56.00	56.50	56.50	57.00	.....
Everett *M6*	.....	61.25	61.75	.....	.....
Fontana *K1*	62.00	62.50	.....	.....	.....
Geneva, Utah *C7*	56.00	56.50	.....	.....	.....
Granite City *G2*	57.90	58.40	58.90	.....	.....
Hubbard *Y1*	.....	.....	56.50	.....	.....
Minnequa *C6*	58.00	59.00	59.00	.....	.....
Monessen *P6*	56.00	.....	.....	.....	.....
Neville Isl. *P4*	56.00	56.50	56.50	.....	.....
Pittsburgh *U1*	56.00	.....	.....	57.00	.....
Sharpsville *S3*	56.00	56.50	56.50	57.00	.....
Steelton *B3*	58.00	58.50	59.00	59.50	64.00
Swedeland *A2*	58.00	58.50	59.00	59.50	.....
Toledo *I4*	56.00	56.50	56.50	57.00	.....
Troy, N. Y. *R3*	58.00	58.50	59.00	59.50	64.00
Youngstown *Y1*	.....	.....	56.50	57.00	.....
N. Tonawanda *T1*	.....	56.50	57.00	.....	.....

DIFFERENTIALS: Add 50¢ per ton for each 0.25 pct silicon over base (1.75 to 2.25 pct except low phos., 1.75 to 2.00 pct), 50¢ per ton for each 0.50 pct manganese over 1 pct., $2 per ton for .05 to 0.75 pct nickel, $1 for each additional 0.25 pct nickel. Subtract 38¢ per ton for phosphorus, content 0.70 and over.

Silvery Iron: Buffalo, *H1*, $68.25; Jackson, *J1, G1*, $67.00. Add $1.50 per ton for each 0.50 pct silicon over base (6.01 to 6.50 pct) up to 17 pct. Add $1 per ton for 0.75 pct. or more phosphorus. Add 75¢ for each 0.50 pct. manganese over 1.0 pct. Bessemer ferrosilicon prices are $1 over comparable silvery iron.

STAINLESS STEEL

Base price cents per lb., f.o.b. mill

← To identify producers, see Key on p. 143 →

Product	301	302	303	304	316	321	347	410	416	430
Ingots, rerolling	16.25	17.25	18.75	18.25	28.00	22.75	24.50	14.00	.....	14.25
Slabs, billets, rerolling	20.50–20.75	22.75	24.75	23.75	36.25	29.50	32.25	18.25	.....	18.50
Forg. discs, die blocks, rings	38.50	38.50	41.50	40.50	60.00	45.50	50.75	31.00	31.75	31.75
Billets, forging	29.50	29.75	32.25	31.00	46.50–46.75	35.25	39.50	24.00	24.50	24.50
Bars, wires, structurals	35.25	35.50	38.25	37.25	55.50	42.00	46.75	28.75	29.25	29.25
Plates	37.25	37.50	39.75	39.75	58.75–59.00	45.75–46.00	51.25	30.00	30.50–31.00	30.50
Sheets	46.25	46.50	48.75	48.75	64.25–64.50	55.50	60.75	40.75	41.25	43.50
Strip, hot-rolled	29.75	32.00	36.75	34.25	55.00	42.00	46.50	26.25	.....	27.00
Strip, cold-rolled	38.25	41.50	45.50	43.75	66.50	54.50	59.25	34.25	41.25	34.75

STAINLESS STEEL PRODUCING POINTS:

Sheets: Midland, Pa., *C11;* Brackenridge, Pa., *A3;* Butler, Pa., *A7;* McKeesport, Pa., *U1;* Washington, Pa., *W2, J2;* Baltimore, *E1;* Middletown, O., *A7;* Massillon, O., *R3;* Gary, *U1;* Bridgeville, Pa., *U2;* New Castle, Ind., *I2;* Ft. Wayne, *J4.*

Strip: Midland, Pa., *C11;* Cleveland, *A5;* Carnegie, Pa., *S9;* McKeesport, Pa., *F1;* Reading, Pa., *C2;* Washington, Pa., *W2;* W. Leechburg, Pa., *A3;* Bridgeville, Pa., *U2;* Detroit, *M2;* Canton-Massillon, O., *R3;* Middletown, O., *A7;* Harrison, N. J., *D3;* Youngstown, *C5;* Sharon, Pa., *S1;* Butler, Pa., *A7;* Wallingford, Conn., *U3* (.25¢ per lb higher) *W1* (25¢ per lb higher); New Bedford, Mass., *R6.*

Bar: Baltimore, *A7;* Duquesne, Pa., *U1;* Munhall, Pa., *U1;* Reading, Pa., *C2;* Titusville, Pa., *U2;* Washington, Pa., *J2;* McKeesport, Pa., *U1, F1;* Bridgeville, Pa., *U2;* Dunkirk, N. Y., *A3;* Massillon, O., *R3;* Chicago, *U1;* Syracuse, N. Y., *C11;* Watervliet, N. Y., *A3;* Waukegan, *A5;* Canton, O., *T5;* Ft. Wayne, *I4.*

Wire: Waukegan, *A5;* Massillon, O., *R3;* McKeesport, Pa., *F1;* Ft. Wayne, *J4;* Harrison, N. J., *D3;* Baltimore, *A7;* Dunkirk, *A3;* Monessen, *P1;* Syracuse, *C11;* Bridgeville, *U2.*

Structurals: Baltimore, *A7;* Massillon, O., *R3;* Chicago, Ill., *J4;* Watervliet, N. Y., *A3;* Syracuse, *C11.*

Plates: Brackenridge, Pa., *A3;* Chicago, *U1;* Munhall, Pa., *U1;* Midland, Pa., *C11;* New Castle, Ind., *I2;* Middletown, *A7;* Washington, Pa., *J2;* Cleveland, Massillon, *R3;* Coatesville, Pa., *C15.*

Forged discs, die blocks, rings: Pittsburgh, *C11;* Syracuse, *C11;* Ferndale, Mich., *A3;* Washington, Pa., *J2.*

Forging billets: Midland, Pa., *C11;* Baltimore, *A7;* Washington, Pa., *J2;* McKeesport, *F1;* Massillon, Canton, O., *R3;* Watervliet, *A3;* Pittsburgh, Chicago, *U1;* Syracuse, *C11.*

WHY IT PAYS TO BUY STEEL FROM WAREHOUSE

You don't have to overstock your special steels!

WHEN YOU BUY STEEL FROM WAREHOUSE, YOU GET:

- LOWER INVENTORY COSTS
- LOWER SPACE COSTS
- LOWER TIME COSTS
- LOWER CAPITAL INVESTMENT
- FASTER PRODUCTION
- FEWER INVENTORY LOSSES

MANUFACTURERS who use small quantities of steels of special grades, sizes or treatments must frequently buy relatively large quantities to get a mill rolling. Then they are faced with the cost of storage, frozen capital, and sometimes LCL freight rates. We can arrange to stock specialized steels and deliver them to you as needed from our nearest warehouse. Frequently we can save you money on such orders. You pay for the steel only as you take it. Usually we can eliminate the delay of waiting for mill shipments. And it's always more convenient to order from warehouse because one of U. S. Steel Supply's 24 offices is near you. Contact your U. S. Steel Supply salesman.

U. S. STEEL SUPPLY

DIVISION

General Office
208 So. La Salle St., Chicago 4, Ill.

USS

Warehouses and Sales Offices
Coast to Coast

UNITED STATES STEEL

STEEL PRICES

(Effective Apr. 27, 1954)

Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.

		BILLETS, BLOOMS, SLABS			PILING	SHAPES STRUCTURALS			STRIP					
		Carbon Rerolling Net Ton	Carbon Forging Net Ton	Alloy Net Ton	Sheet Steel	Carbon	Hi Str. Low Alloy	Carbon Wide-Flange	Hot-rolled	Cold-rolled	Hi Str. H.R. Low Alloy	Hi Str. C.R. Low Alloy	Alloy Hot-rolled	Alloy Cold-rolled
EAST	Bethlehem, Pa.			$82.00 *B3*		4.15 *B3*	6.20 *B3*	4.15 *B3*						
	Buffalo, N. Y.	$62.00 *B3*	$75.50 *B3, R3*	$82.00 *B3, R3*	4.925 *B3*	4.15 *B3*	6.20 *B3*	4.15 *B3*	3.925 *B3, R3*	5.45 *B3*	6.00 *B3*	8.425 *B3*		
	Claymont, Del.													
	Coatesville, Pa.													
	Conshohocken, Pa.								4.05 *A2*		5.90 *A2*			
	New Bedford, Mass.									6.00 *R6*				
	Harrison, N. J.													12.00 *C1*
	Johnstown, Pa.	$62.00 *B3*	$75.50 *B3*	$82.00 *B3*		4.15 *B3*	6.20 *B3*							
	Fairless, Pa.													
	New Haven, Conn.									5.90 *D1* 6.20 *A5*				
	Phoenixville, Pa.					4.15 *P2*		4.95 *P2*						
	Sparrows Pt., Md.								3.925 *B3*	5.45 *B3*	6.00 *B3*	8.425 *B3*		
	Wallingford, Conn.									5.90 *W1*				
	Worcester, Mass.									6.30 *A5*				10.30 *A5* 12.45 *N7*
MIDDLE WEST	Alton, Ill.								4.10 *L1*					
	Ashland, Ky.								3.925 *A7*					
	Canton-Massillon, Dover, Ohio			$82.00 *R3, T5*										12.00 *C6*
	Chicago, Ill.	$62.00 *U1*	$75.50 *R3, U1, W8*	$82.00 *U1, W8, R3*	4.925 *U1*	4.10 *U1, W8*	6.175 *U1, Y1*	4.10 *U1*	3.925 *A1, W8*	5.70 *A1*	5.95 *R3*		6.40 *W8*	
	Cleveland, Ohio		$75.50 *R3*							5.45 *A5, J3*		7.80 *J3* 8.15 *A5*		12.00 *A5* 12.15 *N7*
	Detroit, Mich.			$84.00 *R5*					4.075 *G3* 4.15 *M2*	5.60 *D1, D2, G3, M2, P11*	6.10 *G3*	7.90 *D2* 8.30 *G3*		
	Duluth, Minn.													
	Gary, Ind. Harbor, Indiana	$62.00 *U1*	$75.50 *U1*	$82.00 *U1, Y1*	4.925 *I3*	4.10 *I3, U1*	6.175 *U1, I3*		3.925 *I3, U1, Y1*	5.70 *I3*	5.95 *U1, I3* 6.45 *Y1*		6.40 *U1*	
	Granite City, Ill.													
	Indianapolis, Ind.									5.60 *C5*				
	Mansfield, Ohio													
	Middletown, Ohio									5.45 *A7*				
	Niles, Warren, Ohio Sharon, Pa.								3.925 *S1*	5.45 *S1, T4*	5.95 *S1*	7.65 *S1*	6.40 *S1*	12.00 *S1*
	Pittsburgh, Pa. Midland, Pa. Butler, Pa.	$62.00 *U1, J3*	$75.50 *J3, U1*	$82.00 *U1, C11*	4.925 *U1*	4.10 *J3, U1*	6.175 *J3, U1*	4.10 *U1*	3.925 *A7, P6* 3.95 *S7* 4.425 *S9*	5.45 *B4, J3, S7*		7.80 *J3*	6.40 *S9* 6.45 *S7*	12.00 *S9* 12.15 *S7*
	Portsmouth, Ohio								3.925 *P7*					
	Weirton, Wheeling, Follansbee, W. Va.					4.10 *W3*			3.925 *W3*	5.45 *F3, W3*	5.95 *W3*	8.15 *W3*		
	Youngstown, Ohio			$82.00 *Y1, C10*		4.10 *Y1*	6.675 *Y1*		3.925 *R3, U1, Y1*	5.45 *R3, Y1, C5*	5.95 *U1, R3* 6.45 *Y1*	7.60 *R3* 8.30 *Y1*	6.40 *U1*	12.00 *C5*
WEST	Fontana, Cal.	$70.00 *K1*	$83.50 *K1*	$101.00 *K1*		4.75 *K1*	6.825 *K1*	5.10 *K1*	4.70 *K1*	7.35 *K1*	7.05 *K1*		7.80 *K1*	13.65 *K1*
	Geneva, Utah		$75.50 *C7*			4.10 *C7*	6.175 *C7*							
	Kansas City, Mo.					4.70 *S2*	6.775 *S2*		4.525 *S2*		6.55 *S2*		7.00 *S2*	
	Los Angeles, Torrance, Cal.		$85.00 *B2*	$102.00 *B2*		4.80 *B2, C7*	6.85 *B2*		4.675 *B2, C7*	7.50 *C1*			7.60 *B2*	
	Minnequa, Colo.					4.55 *C6*			5.025 *C6*					
	San Francisco, Niles, Pittsburg, Cal.		$85.00 *B2*			4.75 *B2* 4.91 *P9*	6.80 *B2*		4.675 *B2, C7*					
	Seattle, Wash.		$89.00 *B2*			4.85 *B2*	6.90 *B2*							
SOUTH	Atlanta, Ga.								4.125 *A8*					
	Fairfield, Ala. City, Birmingham, Ala.	$62.00 *T2*	$75.50 *T2*			4.10 *R3, T2*	6.175 *T2*		3.925 *R3, T2, C16*		5.95 *T2*			
	Houston, Tex.		$83.50 *S2*	$90.00 *S2*		4.50 *S2*			4.325 *S2*				6.80 *S2*	

IRON AGE

STEEL PRICES

(Effective Apr. 27, 1954)

Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.

		SHEETS									WIRE ROD	TINPLATE†		BLACK PLATE
		Hot-rolled *18* ga. & hvyr.	Cold-rolled	Galvanized *10* ga.	Enameling *12* ga.	Long Terne *10* ga.	Hi Str. Low Alloy H.R.	Hi Str. Low Alloy C.R.	Hi Str. Low Alloy Galv.	Hot-rolled *19* ga.		Cokes* *1.25*-lb. base box	Electro* *0.25*-lb. base box	Hollowware Enameling *29* ga.
EAST	Bethlehem, Pa.													
	Buffalo, N. Y.	3.925 *B3*	4.775 *B3*				5.90 *B3*	7.225 *B3*			4.525 *W6*			
	Claymont, Del.											† Special coated mfg. terne deduct 95¢ from 1.25-lb coke base box price. Can-making quality blackplate 55 to 128 lb deduct $2.20 from 1.25-lb coke base box. * COKES: 1.50-lb add 25¢. ELECTRO: 0.50-lb add 25¢; 0.75-lb add 65¢; 1.00-lb add $1.20.		
	Coatesville, Pa.													
	Conshohocken, Pa.	3.975 *A2*					5.90 *A2*							
	Harrisburg, Pa.													
	Hartford, Conn.													
	Johnstown, Pa.										4.525 *B3*			
	Fairless, Pa.	3.975 *U1*	4.825 *U1*				5.95 *U1*	7.275 *U1*				$8.80 *U1*	$7.50 *U1*	
	New Haven, Conn.													
	Phoenixville, Pa.													
	Sparrows Pt., Md.	3.925 *B3*	4.775 *B3*	5.275 *B3*			5.90 *B3*	7.225 *B3*	8.075 *B3*		4.625 *B3*	$8.80 *B3*	$7.50 *B3*	
	Worcester, Mass.										4.825 *A5*			
	Trenton, N. J.													
MIDDLE WEST	Alton, Ill.										4.70 *L1*			
	Ashland, Ky.	3.925 *A7*		5.275 *A7*	5.175 *A7*									
	Canton-Massillon, Dover, Ohio			5.275 *R1, R3*						5.05 *R1*				
	Chicago, Joliet, Ill.	3.925 *A1, W8*					5.90 *U1*				4.525 *A5, N4, R3*			
	Sterling, Ill.										4.625 *N4*			
	Cleveland, Ohio	3.925 *J3, R3*	4.775 *J3, R3*		5.175 *R3*		5.90 *J3, R3*	7.225 *J3, R3*			4.525 *A5*			
	Detroit, Mich.	4.075 *G3, M2*	4.925 *G3*				6.05 *G3*	7.375 *G3*						
	Newport, Ky.	3.925 *N5*												
	Gary, Ind. Harbor, Indiana	3.925 *I3, U1, Y1*	4.775 *I3, U1, Y1*	5.275 *U1, I3*	5.175 *I3, U1*	5.675 *U1*	5.90 *U1, I3* 6.40 *Y1*	7.225 *U1* 7.725 *Y1*				$8.70 *I3, U1, Y1*	$7.40 *I3, U1*	6.10 *U1, Y1*
	Granite City, Ill.	4.125 *G2*	4.975 *G2*	5.475 *G2*	5.375 *G2*								$7.60 *G2*	6.30 *G2*
	Kokomo, Ind.	4.025 *C9*		5.375 *C9*						5.025 *C9*	4.625 *C9*			
	Mansfield, Ohio					5.675 *E2*				5.05 *E2*				
	Middletown, Ohio		4.775 *A7*		5.175 *A7*	5.675 *A7*								
	Niles, Ohio Sharon, Pa.	3.925 *S1* 5.175 *N3*	5.80 *N3*	5.275 *N3*	6.525 *N3*	5.45 *S1* 5.675 *N3*	5.90 *S1*						$7.40 *R3*	
	Pittsburgh, Pa. Midland, Pa. Butler, Pa.	3.925 *J3, U1, P6, A7*	4.775 *J3, U1, P6*	5.275 *U1*	5.175 *U1*		5.90 *J3, U1*	7.225 *J3, U1*	7.925 *U1*		4.525 *A5* 4.725 *P6*	$8.70 *J3, U1*	$7.40 *J3, U1*	6.10 *U1*
	Portsmouth, Ohio	3.925 *P7*	4.775 *P7*								4.525 *P7*			
	Weirton, Wheeling, Follansbee, W. Va.	3.925 *W3, W5*	4.775 *W3, W5, F3*	5.275 *W3, W5*		5.675 *W3, W5*	5.90 *W3*	7.225 *W3*				$8.70 *W3, W5*	$7.40 *W3, W5*	6.10 *F3, W5*
	Youngstown, Ohio	3.925 *R3, U1, Y1*	4.775 *R3, Y1*		5.175 *Y1*		5.90 *U1, R3* 6.40 *Y1*	7.225 *R3* 7.725 *Y1*			4.525 *Y1*	$8.70 *R3*		
WEST	Fontana, Cal.	4.70 *K1*	5.875 *K1*				6.675 *K1*	8.275 *K1*			5.325 *K1*			
	Geneva, Utah	4.025 *C7*												
	Kansas City, Mo.									4.775 *C6*	4.865 *S2*			
	Los Angeles, Torrance, Cal.	4.625 *C7*		6.275 *C7*							5.325 *B2*			
	Minnequa, Colo.										4.775 *C6*			
	San Francisco, Niles, Pittsburg, Cal.	4.625 *C7*	5.725 *C7*	6.025 *C7*							5.175 *C7*	$9.45 *C7*	$8.15 *C7*	
	Seattle, Wash.													
SOUTH	Atlanta, Ga.													
	Fairfield, Ala. Alabama City, Ala.	3.925 *R3, T2*	4.775 *T2*	5.275 *R3, T2*			5.90 *T2*			5.125 *T2* 5.225 *R3*	4.525 *T2* *R3*	$8.80 *T2*	$7.50 *T2*	
	Houston, Texas	4.325 *S2*									4.925 *S2*			

IRON AGE

STEEL PRICES

(Effective Apr. 27, 1954)

Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.

		BARS						PLATES				WIRE
		Carbon Steel	Reinforcing	Cold Finished	Alloy Hot-rolled	Alloy Cold Drawn	Hi Str. H.R. Low Alloy	Carbon Steel	Floor Plate	Alloy	Hi Str. Low Alloy	Mfg'r. Bright
EAST	Bethlehem, Pa.				4.875 *B3*	6.325 *B3*	6.225 *B3*					
	Buffalo, N. Y.	4.15 *B3* 4.18 *R3*	4.15 *B3,R3*	5.25 *B5*	4.875 *B3,R3*	6.325 *B3,B5*	6.225 *B3*	4.10 *B3*			6.25 *B3*	5.525 *W6*
	Claymont, Del.							4.10 *C4*		5.55 *C4*		
	Centreville, Pa.							4.10 *L4*		5.55 *L4*		
	Conshohocken, Pa.							4.10 *A2*	5.15 *A2*		6.25 *A2*	
	Harrisburg, Pa.							4.10 *C3*	5.15 *C3*			
	Hartford, Conn.			5.75 *R3*		6.775 *R3*						
	Johnstown, Pa.	4.15 *B3*	4.15 *B3*		4.875 *B3*		6.225 *B3*	4.10 *B3*		5.55 *B3*	6.25 *B3*	5.525 *B3*
	Fairless, Pa.	4.30 *U1*	4.30 *U1*		5.025 *U1*							
	Newark, N. J.			5.65 *W10*		6.65 *W10*						
	New Haven, Conn.											
	Camden, N. J.			5.65 *P10*		6.50 *P10*						
	Putnam, Conn.			5.75 *W10*								
	Sparrows Pt., Md.		4.15 *B3*					4.10 *B3*		5.55 *B3*	6.25 *B3*	5.625 *B3*
	Palmer, Worcester, Mansfield, Mass.			5.75 *B5* 6.10 *W11*		6.775 *B5*						5.825 *A5, W6*
	Readville, Mass.			5.75 *C14*								
MIDDLE WEST	Alton, Ill.	4.35 *L1*										5.70 *L1*
	Ashland, Ky.							4.10 *A7*				
	Canton-Massillon, Ohio			5.20 *R2,R3*	4.875 *R3,T5*	6.325 *R2,R3, T5*						
	Chicago, Joliet, Ill.	4.15 *U1, N4,W8* 4.22 *R3*	4.15 *R3,N4*	5.20 *A5,W10, W8,B5,L2*	4.875 *U1, W8,R3*	6.325 *A5,W8, W10,L2, R3,B5*		4.10 *U1,W8*	5.15 *U1*	5.55 *U1*	6.25 *U1*	5.525 *A1, R3,N4,W1*
	Cleveland, Ohio	4.21 *R3*	4.15 *R3*	5.20 *A5,C13*		6.325 *A5, C13*		4.10 *J3,R3*	5.15 *J3*		6.25 *J3*	5.525 *A5, R3,C13*
	Detroit, Mich.	4.30 *R5, G3*		5.35 *R5,P8* 5.40 *B5* 5.45 *P3*	4.975 *R5* 5.025 *G3*	6.425 *R5* 6.475 *P8* 6.525 *B5,P3*	6.375 *G3*	4.25 *G3*			6.40 *G3*	
	Duluth, Minn.											5.525 *A5*
	Gary, Ind. Harbor, Crawfordsville	4.15 *I3, U1, Y1*	4.15 *I3, U1, Y1*	5.20 *R3*	4.875 *I3, U1, Y1*	6.325 *R3,M5*	6.225 *U1,I3* 6.725 *Y1*	4.10 *I3, U1, Y1*	5.15 *I3*	5.55 *U1*	6.25 *U1,I3* 6.75 *Y1*	5.625 *M4*
	Granite City, Ill.							4.30 *G2*				
	Kokomo, Ind.											5.625 *C9*
	Sterling, Ill.	4.25 *N4*	4.25 *N4*									5.625 *N4*
	Niles, Ohio Sharon, Pa.							4.10 *S1*		5.55 *S1*	6.25 *S1*	
	Pittsburgh, Pa. Midland, Pa.	4.15 *J3, U1*	4.15 *J3, U1*	5.20 *A5, J3, W10,R3,C8*	4.875 *U1,C11*	6.325 *A5,C11, W10,C8*	6.225 *J3, U1*	4.10 *J3, U1*	5.15 *U1*	5.55 *U1*	6.25 *J3, U1*	5.525 *A5, J3,P6*
	Portsmouth, Ohio											5.525 *P7*
	Weirton, Wheeling, Follansbee, W. Va.	4.15 *W3*						4.10 *W3*				
	Youngstown, Ohio	4.15 *U1,Y1* 4.20 *R3*	4.15 *R3, U1, Y1*	5.20 *Y1,F2*	4.875 *U1,Y1, C10*	6.325 *Y1, C10,F2*	6.225 *U1* 6.725 *Y1*	4.10 *R3, U1, Y1*			6.75 *Y1*	5.525 *Y1*
WEST	Emeryville, Cal.	4.90 *J5*	4.90 *J5*									
	Fontana, Cal.	4.85 *K1*	4.85 *K1*		5.925 *K1*		7.475 *K1*	4.75 *K1*		6.60 *K1*	6.95 *K1*	
	Geneva, Utah							4.10 *C7*			6.25 *C7*	
	Kansas City, Mo.	4.75 *S2*	4.75 *S2*		5.475 *S2*		6.825 *S2*					6.125 *S2*
	Los Angeles, Torrance, Cal.	4.85 *B2,C7*	4.85 *B2,C7*	6.65 *R3*	5.925 *B2*		6.925 *B2*					6.475 *B2*
	Minnequa, Colo.	4.60 *C6*	4.75 *C6*					4.95 *C6*				5.775 *C6*
	Portland, Ore.	4.90 *O2*										
	San Francisco, Niles, Pittsburg, Cal.	4.85 *C7,P9* 4.90 *B2*	4.85 *C7,P9* 4.90 *B2*				6.975 *B2*					6.475 *C7*
	Seattle, Wash.	4.90 *B2,N6*	4.90 *B2*				6.975 *B2*	5.00 *B2*			7.15 *B2*	
SOUTH	Atlanta, Ga.	4.35 *A8*	4.35 *A8*									5.725 *A8*
	Fairfield, Ala. City, Birmingham, Ala.	4.15 *T2,C16* 4.18 *R3*	4.15 *R3,T2, C16*				6.225 *T2*	4.10 *R3,T2*			6.25 *T2*	5.525 *R3, T2*
	Houston, Ft. Worth, Lone Star, Tex.	4.55 *S2*	4.55 *S2*		5.275 *S2*			4.50 *L3, S2*				5.925 *S2*

Steel Prices

(Effective Apr. 27, 1954)

Key to Steel Producers

With Principal Offices

A1 Acme Steel Co., Chicago
A2 Alan Wood Steel Co., Conshohocken, Pa.
A3 Allegheny Ludlum Steel Corp., Pittsburgh
A4 American Cladmetals Co., Carnegie, Pa.
A5 American Steel & Wire Div., Cleveland
A6 Angel Nail & Chaplet Co., Cleveland
A7 Armco Steel Corp., Middletown, O.
A8 Atlantic Steel Co., Atlanta, Ga.

B1 Babcock & Wilcox Tube Div., Beaver Falls, Pa.
B2 Bethlehem Pacific Coast Steel Corp., San Francisco
B3 Bethlehem Steel Co., Bethlehem, Pa.
B4 Blair Strip Steel Co., New Castle, Pa.
B5 Bliss & Laughlin, Inc., Harvey, Ill.

C1 Calstrip Steel Corp., Los Angeles
C2 Carpenter Steel Co., Reading, Pa.
C3 Central Iron & Steel Co., Harrisburg, Pa.
C4 Claymont Products Dept., Claymont, Del.
C5 Cold Metal Products Co., Youngstown
C6 Colorado Fuel & Iron Corp., Denver
C7 Columbia Geneva Steel Div., San Francisco
C8 Columbia Steel & Shafting Co., Pittsburgh
C9 Continental Steel Corp., Kokomo, Ind.
C10 Copperweld Steel Co., Pittsburgh, Pa.
C11 Crucible Steel Co. of America, New York
C12 Cumberland Steel Co., Cumberland, Md.
C13 Cuyahoga Steel & Wire Co., Cleveland
C14 Compressed Steel Shafting Co., Readville, Mass.
C15 G. O. Carlson, Inc., Thorndale, Pa.
C16 Connors Steel Div., Birmingham

D1 Detroit Steel Corp., Detroit
D2 Detroit Tube & Steel Div., Detroit
D3 Driver Harris Co., Harrison, N. J.
D4 Dickson Weatherproof Nail Co., Evanston, Ill.

E1 Eastern Stainless Steel Corp., Baltimore
E2 Empire Steel Co., Mansfield, O.

F1 Firth Sterling, Inc., McKeesport, Pa.
F2 Fitzsimmons Steel Corp., Youngstown
F3 Follansbee Steel Corp., Follansbee, W. Va.

G1 Globe Iron Co., Jackson, O.
G2 Granite City Steel Co., Granite City, Ill.
G3 Great Lakes Steel Corp., Detroit
G4 Greer Steel Co., Dover, O.

H1 Hanna Furnace Corp., Detroit

I2 Ingersoll Steel Div., Chicago
I3 Inland Steel Co., Chicago
I4 Interlake Iron Corp., Cleveland

J1 Jackson Iron & Steel Co., Jackson, O.
J2 Jessop Steel Corp., Washington, Pa.
J3 Jones & Laughlin Steel Corp., Pittsburgh
J4 Joslyn Mfg. & Supply Co., Chicago
J5 Judson Steel Corp., Emeryville, Calif.

K1 Kaiser Steel Corp., Fontana, Cal.
K2 Keystone Steel & Wire Co., Peoria
K3 Koppers Co., Granite City, Ill.

L1 Laclede Steel Co., St. Louis
L2 La Salle Steel Co., Chicago
L3 Lone Star Steel Co., Dallas
L4 Lukens Steel Co., Coatesville, Pa.

M1 Mahoning Valley Steel Co., Niles, O
M2 McLouth Steel Corp., Detroit
M3 Mercer Tube & Mfg. Co., Sharon, Pa.
M4 Mid-States Steel & Wire Co., Crawfordsville, Ind.
M5 Monarch Steel Co., Inc., Hammond, Ind.
M6 Mystic Iron Works, Everett, Mass.

N1 National Supply Co., Pittsburgh
N2 National Tube Co., Pittsburgh
N3 Niles Rolling Mill Div., Niles, O.
N4 Northwestern Steel & Wire Co., Sterling, Ill.
N5 Newport Steel Corp., Newport, Ky.
N6 Northwest Steel Rolling Mills, Seattle
N7 Newman Crosby Steel Co., Pawtucket, R. I.

O1 Oliver Iron & Steel Co., Pittsburgh
O2 Oregon Steel Mills, Portland

P1 Page Steel & Wire Div., Monessen, Pa.
P2 Phoenix Iron & Steel Co., Phoenixville, Pa.
P3 Pilgrim Drawn Steel Div., Plymouth, Mich.
P4 Pittsburgh Coke & Chemical Co., Pittsburgh
P5 Pittsburgh Screw & Bolt Co., Pittsburgh
P6 Pittsburgh Steel Co., Pittsburgh
P7 Portsmouth Div., Detroit Steel Corp., Detroit
P8 Plymouth Steel Co., Detroit
P9 Pacific States Steel Co., Niles, Cal.
P10 Precision Drawn Steel Co., Camden, N. J.
P11 Production Steel Strip Corp., Detroit

R1 Reeves Steel & Mfg. Co., Dover, O.
R2 Reliance Div., Eaton Mfg. Co., Massillon, O.
R3 Republic Steel Corp., Cleveland
R4 Roebling Sons Co., John A., Trenton, N. J.
R5 Rotary Electric Steel Co., Detroit
R6 Rodney Metals, Inc., New Bedford, Mass.
R7 Rome Strip Steel Co., Rome, N. Y.

S1 Sharon Steel Corp., Sharon, Pa.
S2 Sheffield Steel Corp., Kansas City
S3 Shenango Furnace Co., Pittsburgh
S4 Simonds Saw & Steel Co., Fitchburg, Mass.
S5 Sloss Sheffield Steel & Iron Co., Birmingham
S6 Standard Forging Corp., Chicago
S7 Stanley Works, New Britain, Conn.
S8 Superior Drawn Steel Co., Monaca, Pa.
S9 Superior Steel Corp., Carnegie, Pa.
S10 Sweet's Steel Co., Williamsport, Pa.

T1 Tonawanda Iron Div., N. Tonawanda, N. Y.
T2 Tennessee Coal & Iron Div., Fairfield
T3 Tennessee Products & Chem. Corp., Nashville
T4 Thomas Strip Div., Warren, O.
T5 Timken Steel & Tube Div., Canton, O.
T6 Tremont Nail Co., Wareham, Mass.
T7 Texas Steel Co., Fort Worth

U1 United States Steel Corp., Pittsburgh
U2 Universal-Cyclops Steel Corp., Bridgeville, Pa.
U3 Fred Ulbrich & Sons, Wallingford, Conn.

W1 Wallingford Steel Co., Wallingford, Conn.
W2 Washington Steel Corp., Washington, Pa.
W3 Weirton Steel Co., Weirton, W. Va.
W4 Wheatland Tube Co., Wheatland, Pa.
W5 Wheeling Steel Corp., Wheeling, W. Va.
W6 Wickwire Spencer Steel Div., Buffalo
W7 Wilson Steel & Wire Co., Chicago
W8 Wisconsin Steel Co., S. Chicago, Ill.
W9 Woodward Iron Co., Woodward, Ala.
W10 Wyckoff Steel Co., Pittsburgh
W11 Worcester Pressed Steel Co., Worcester, Mass.

Y1 Youngstown Sheet & Tube Co., Youngstown

PIPE AND TUBING

Base discounts (pct) f.o.b. mills. Base price about $200 per net ton.

	BUTTWELD														SEAMLESS							
	½ In.		¾ In.		1 In.		1¼ In.		1½ In.		2 In.		2½–3 In.		2 In.		2½ In.		3 In.		3½–4 In.	
	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.
STANDARD T. & C.																						
Sparrows Pt. *B3*	24.25	8.0	27.25	12.0	29.75	15.5	32.25	16.5	32.75	17.5	33.25	18.0	34.75	18.0								
Youngstown *R3*	26.25	10.0	29.25	14.0	31.75	17.5	34.25	18.5	34.75	19.5	35.25	20.0	36.75	20.0								
Fontana *K1*	13.25	+2.0	16.25	1.0	16.75	4.5	21.25	5.5	21.75	6.5	22.25	7.0	23.75	7.0								
Pittsburgh *J3*	26.25	10.0	29.25	14.0	31.75	17.5	34.25	18.5	34.75	19.5	35.25	20.0	36.75	20.0	15.75	0.0	19.75	2.5	22.25	5.0	23.75	6.5
Alton, Ill. *L1*	24.25	8.0	27.25	12.0	29.75	15.5	32.25	16.5	32.75	17.5	33.25	18.0	34.75	18.0								
Sharon *M3*	26.25	10.0	29.25	14.0	31.75	17.5	34.25	18.5	34.75	19.5	35.25	20.0	36.75	20.0								
Fairless *N2*	24.25		27.25		29.75		32.25		32.75		33.25		34.75									
Pittsburgh *N1*	26.25	10.0	29.25	14.0	31.75	17.5	34.25	18.5	34.75	19.5	35.25	20.0	36.75	20.0	15.75	0.0	19.75	2.5	22.25	5.0	23.75	6.5
Wheeling *W5*	26.25	10.0	29.25	14.0	31.75	17.5	34.25	18.5	34.75	19.5	35.25	20.0	36.75	20.0								
Wheatland *W4*	26.25	10.0	29.25	14.0	31.75	17.5	34.25	18.5	34.75	19.5	35.25	20.0	36.75	20.0								
Youngstown *Y1*	26.25	10.0	29.25	14.0	31.75	17.5	34.25	18.5	34.75	19.5	35.25	20.0	36.75	20.0	15.75	0.0	19.75	2.5	22.25	5.0	23.75	6.5
Indiana Harbor *Y1*	25.25	9.0	28.25	13.0	30.75	16.5	33.25	17.5	33.75	18.5	34.25	19.0	35.75	19.0								
Lorain *N2*	26.25	10.0	29.25	14.0	31.75	17.5	34.25	18.5	34.75	19.5	35.25	20.0	36.75	20.0	15.75	0.0	19.75	2.5	22.25	5.0	23.75	6.5
EXTRA STRONG PLAIN ENDS																						
Sparrows Pt. *B3*	27.75	13.0	31.75	17.0	33.75	20.5	34.25	19.5	34.75	20.5	35.25	21.0	35.75	20.0								
Youngstown *R3*	29.75	15.0	33.75	19.0	35.75	22.5	36.25	21.5	36.75	22.5	37.25	23.0	37.75	22.0								
Fontana *K1*	16.75		20.75		22.75		23.25		23.75		24.25		24.75									
Pittsburgh *J3*	29.75	15.0	33.75	19.0	35.75	22.5	36.25	21.5	36.75	22.5	37.25	23.0	37.75	22.0	16.25	0.75	20.75	3.75	23.75	6.75	28.75	9.75
Alton, Ill. *L1*	27.75	13.0	31.75	17.0	33.75	20.5	34.25	19.5	34.75	20.5	35.25	21.0	35.75	20.0								
Sharon *M3*	29.75	15.0	33.75	19.0	35.75	22.5	36.25	21.5	36.75	22.5	37.25	23.0	37.75	22.0								
Pittsburgh *N1*	29.75	15.0	33.75	19.0	35.75	22.5	36.25	21.5	36.75	22.5	37.25	23.0	37.75	22.0	16.25	0.75	20.75	3.75	23.75	6.75	28.75	9.75
Wheeling *W5*	29.75	15.0	33.75	19.0	35.75	22.5	36.25	21.5	36.75	22.5	37.25	23.0	37.75	22.0								
Wheatland *W4*	29.75	15.0	33.75	19.0	35.75	22.5	36.25	21.5	36.75	22.5	37.25	23.0	37.75	22.0								
Youngstown *Y1*	29.75	15.0	33.75	19.0	35.75	22.5	36.25	21.5	36.75	22.5	37.25	23.0	37.75	22.0	16.25	0.75	20.75	3.75	23.75	6.75	28.75	9.75
Indiana Harbor *Y1*	28.75	14.0	32.75	18.0	34.75	21.5	35.25	20.5	35.75	21.5	36.25	22.0	36.75	21.0								
Lorain *N2*	29.75	15.0	33.75	19.0	35.75	22.5	36.25	21.5	36.75	22.5	37.25	23.0	37.75	22.0	16.25	0.75	20.75	3.75	23.75	6.75	28.75	9.75

Galvanized discounts based on zinc, at 11¢ per lb, East St. Louis. For each 1¢ change in zinc, discounts vary as follows: ⅛ in., ¾ in., and 1 in., 1 pt.; 1¼ in., 1½ in., 2 in., ¾ pt.; 2½ in., 3 in., ½ pt. Calculate discounts on even cents per lb of zinc, i.e., if zinc is 16.51¢ to 17.50¢ per lb, use 17¢. Jones & Laughlin discounts apply only when zinc price changes 1¢. Threads only buttweld and seamless, 2¼ pts. higher discount. Plain ends, buttweld and seamless, 3 in. and under, 4½ pts. higher discount. Buttweld jobbers' discount, 5 pct. East St. Louis zinc price now 10.25¢.

Steel Prices

(Effective Apr. 27, 1954)

To identify producers, see Key on preceding page

RAILS, TRACK SUPPLIES

F.o.b. Mill Cents Per Lb	No. 1 Std. Rails	Light Rails	Joint Bars	Track Spikes	Screw Spikes	Tie Plates	Track Bolts Treated
Bessemer *U1*	4.325	5.20	5.275	.....	.....	.....	.....
So. Chicago *R3*	.....	.....	.....	7.05	.....	.....	.....
Cleveland *R3*	.....	.....	.....	.....	.....	.....	.....
Ensley *T2*	4.325	5.20	.....	.....	.....	.....	.....
Fairfield *T2*	.....	5.20	.....	7.05	.....	5.125	.....
Gary *U1*	4.325	5.20	.....	.....	.....	5.125	.....
Ind. Harbor *I3*	4.325	.....	5.275	7.05	.....	5.125	.....
Johnstown *B3*	.....	5.20	.....	.....	.....	.....	.....
Joliet *U1*	.....	5.20	5.275	.....	.....	.....	.....
Kansas City *S2*	.....	.....	.....	7.30	.....	.....	11.00
Lackawanna *B3*	4.325	5.20	5.275	.....	.....	5.125	.....
Lebanon *B3*	.....	.....	.....	7.05	10.50	.....	11.00
Minnequa *C6*	4.325	5.70	5.275	7.05	.....	5.125	11.00
Pittsburgh *O1*	.....	.....	.....	.....	10.50	.....	11.00
Pittsburgh *P5*	.....	.....	.....	.....	10.50	.....	11.00
Pittsburgh *J3*	.....	.....	.....	7.05	.....	.....	.....
Pitt'g, Cal. *C7*	.....	.....	.....	.....	.....	5.275	.....
Seattle *B7*	.....	.....	.....	7.55	.....	5.275	11.50
Steelton *B3*	4.325	.....	5.275	.....	.....	5.125	.....
Struthers *Y1*	.....	.....	.....	.....	.....	.....	.....
Torrance *C7*	.....	.....	.....	.....	.....	5.275	.....
Youngstown *R3*	.....	.....	.....	7.05	.....	.....	.....

ELECTRICAL SHEETS

22-Gage F.o.b. Mill Cents per Lb	Hot-Rolled (Cut Lengths)*	Cold-Reduced (Coiled or Cut Length) Semi-Processed	Fully Processed
Field	.....	8.05	.....
Armature	8.15	8.40	8.90
Elect.	8.75	9.00	9.50
Motor	9.75	10.00	10.50
Dynamo	10.65	10.90	11.40
Trans. 72	11.60	11.85	12.35
		Grain Oriented	
Trans. 65	12.15	Trans. 80	16.25
Trans. 58	12.65	Trans. 73	16.75
Trans. 52	13.65		

Producing points: Beech Bottom (*W5*); Brackenridge (*A5*); Granite City (*G2*); Indiana Harbor (*I3*); Mansfield (*E2*); Newport, Ky. (*N5*); Niles, O. (*N3*); Vandergrift (*U1*); Warren, O. (*R3*); Zanesville (*A7*).

* Coils 75¢ higher.

CLAD STEEL

	Plate	Sheet
Stainless-carbon		
No. 304, 20 pct.		
Coatesville, Pa., *L4*	*32.7	
Washington, Pa., *J2*	....	
Claymont, Del., *C4*	....	
New Castle, Ind., *I2*	....	32.50
Nickel-carbon		
10 pct. Coatesville, Pa., *L4*	37.5	
Inconel-carbon		
10 pct. Coatesville, Pa., *L4*	46.10	
Monel-carbon		
10 pct. Coatesville, Pa., *L4*	38.90	

* Includes annealing and pickling, sandblasting.

MERCHANT WIRE PRODUCTS

F.o.b. Mill	Standard & Coated Nails Col	Woven Wire Fence 9–15½ ga. Col	"T" Fence Posts Col	Single Loop Bale Ties Col	Galv. Barbed and Twisted Barbless Wire Col	Merch. Wire Ann'ld ¢/lb.	Merch. Wire* Galv. ¢/lb.
Alabama City *R3*	131	140	...	149	153	6.675	7.075
Aliquippa, Pa. *J3*	131	143	...	...	156	6.675	7.20
Atlanta *A8*	133	145	...	151	158	6.775	7.30
Bartonville *K2*	133	144	...	...	157	6.775	7.275
Buffalo *W6*	.....	.....	.....	.....	.....	.....	.....
Chicago, Ill. *N4*	131	143	...	149	156	6.675	7.20
Cleveland *A6*	137	.....	.....	.....	.....	.....	.....
Cleveland *A5*	.....	.....	.....	.....	.....	6.675	.....
Crawfordsville *M4*	133	145	...	151	153	6.775	7.325
Donora, Pa. *A5*	131	140	...	149	153	6.675	7.075
Duluth *A5*	131	140	145	149	153	6.675	7.075
Fairfield, Ala. *T2*	131	140	...	149	153	6.675	7.075
Galveston *D4*	139	148	.....	.....	.....	6.675	7.075
Houston *S2*	139	148	.....	.....	161	7.075	7.475
Johnstown, Pa. *B3*	131	143	145	.....	156	6.675	7.225
Joliet, Ill. *A5*	131	140	...	149	153	6.675	7.075
Kokomo, Ind. *C9*	133	142	...	151	155	6.775	7.175
Los Angeles *B2*	.....	.....	.....	.....	.....	7.625	.....
Kansas City *S2*	143	152	...	161	165	7.275	7.675
Minnequa *C6*	136	148	150	154	162	6.925	7.325
Monessen *P6*	131	145	...	...	157	6.675	7.225
Moline, Ill. *R3*	.....	.....	145	.....	.....	.....	.....
Pittsburg, Cal. *C7*	150	163	...	173	173	7.625	8.025
Portsmouth *P7*	.....	.....	.....	.....	.....	6.675	.....
Rankin, Pa. *A5*	131	140	...	...	153	6.675	7.075
So. Chicago *R3*	131	140	145	149	153	6.675	7.075
S. San Francisco *C6*	.....	.....	.....	.....	173	.....	.....
Sparrows Pt. *B3*	133	.....	.....	151	158	6.775	7.325
Struthers, O. *Y1*	.....	.....	.....	.....	.....	6.675	7.175
Worcester *A5*	137	.....	.....	.....	.....	6.975	.....
Williamsport, Pa. *S10*	133	.....	158	.....	.....	.....	.....

Cut Nails, carloads, base $8.00 per keg (less 20¢ to jobbers), at Conshohocken, Pa. (*A2*).

* Alabama City and So. Chicago don't include zinc extra. Galvanized products computed with zinc at 11.0¢ per lb.

WAREHOUSES

Base price, f.o.b., dollars per 100 lb.

Cities	City Delivery Charge	Sheets: Hot-Rolled	Sheets: Cold-Rolled (15 gage)	Sheets: Galvanized (10 gage)	Strip: Hot-Rolled	Strip: Cold-Rolled	Plates	Shapes: Standard Structural	Bars: Hot-Rolled	Bars: Cold-Finished	Alloy Bars: Hot-Rolled A-4615 As rolled	Alloy Bars: Hot-Rolled A-4140 Annealed	Alloy Bars: Cold-Drawn A-4615 As rolled	Alloy Bars: Cold-Drawn A-4140 Annealed
Baltimore	$.20	6.20	7.12–7.64	7.36–7.78	7.00	.....	6.85	6.98	6.86	8.17	.....	.....	.....	.....
Birmingham	.15	6.10	7.00	8.00[4]	6.30	.....	6.35	6.35	6.15	8.90	.....	.....	.....	.....
Boston	.20	6.89	7.83–8.38	9.18	7.13	9.35[2]	7.13	7.06	6.87	8.35	12.40	11.94–12.28	14.65	14.55–14.58
Buffalo	.20	6.18–6.20	7.15	8.70	6.65–6.79	.....	6.65–6.68	6.55–6.59	6.35	7.70	.....	11.95–12.15	14.45	14.25–14.55
Chicago	.20	6.18	7.12	8.00	6.42	.....	6.33	6.46	6.28	7.30	.....	11.60	.....	14.05
Cincinnati	.20	6.30	7.11	.....	6.66	.....	6.62	6.93	6.52	7.60	.....	11.85	.....	14.30
Cleveland	.20	6.18	7.12	7.90–8.25	6.58	.....	6.50	6.79	6.34	7.40	12.04	11.74	14.29	14.19
Denver	.....	7.95	8.85	10.45–10.47	8.20	9.55	7.95	7.95	8.05	9.05	.....	.....	.....	15.75
Detroit	.20	6.35–6.45	7.29–7.31	8.42	6.69–7.71	7.36	6.80	6.91–6.93	6.56	7.60	12.47	11.92	14.42	13.44–14.62
Houston	.20	7.15	7.45–7.60	9.23	7.45	.....	7.20	7.35	7.45	9.30–9.40	.....	12.80	.....	.....
Kansas City	.20	6.85	.....	.....	7.09	.....	7.00	7.13	6.95	8.07	.....	.....	.....	.....
Los Angeles	.20	7.25	9.00	9.35	7.55	.....	7.20	7.35	7.15	9.10–9.75	.....	12.90	.....	15.90
Memphis	.10	6.79	7.69	.....	6.90	.....	7.01	7.09	6.88	7.89–8.76	.....	.....	.....	.....
Milwaukee	.20	6.35	7.29	8.17	6.59	.....	6.50	6.63	6.45	7.57	.....	11.77	.....	14.22
New Orleans	.15	6.51	7.41	.....	6.63	.....	6.73	6.81	6.60	8.37	.....	.....	.....	.....
New York	.30	6.78	7.75–8.37	8.41[7]–8.42	7.16	9.15[8]	6.99	6.90	7.06	8.43	12.29	11.99	14.54	14.44
Norfolk	.20	6.90	.....	.....	7.00	.....	7.00	7.00	7.00	8.50	.....	.....	.....	.....
Philadelphia	.25	6.35–6.53	7.13	7.87	7.02	.....	6.63	6.67	6.87	8.19	.....	11.74	.....	14.19
Pittsburgh	.20	6.18	7.12	8.30	6.55	.....	6.33	6.46	6.28	7.65	.....	11.60	.....	14.05
Portland	.10	7.90–8.75	8.45–9.75	9.05–9.15	7.65	.....	7.30	7.25	7.35	10.65	.....	.....	.....	.....
Salt Lake City	.20	8.60	10.50	10.50[3]	9.25	.....	8.10	8.25	9.20	11.25	.....	.....	.....	.....
San Francisco	.20	7.35	8.70	10.15	7.60	.....	7.20	7.25	7.15	9.75	.....	12.90	.....	15.90
Seattle	.20	7.95–8.15	9.30–9.50	9.80	7.80–8.00	.....	7.40–7.60	7.30–7.50	7.40–7.60	10.45–10.65	.....	13.15	.....	15.60
St. Louis	.20	6.48	7.42	8.25–8.30	6.72	7.70–8.53	6.73	6.86	6.58	7.70	12.20	11.90	14.45	14.30–14.35
St. Paul	.15	6.84	7.78–8.33	8.66	7.08	13.22	6.99	7.12	6.94	8.06	.....	12.42	.....	.....

Base Quantities (Standard unless otherwise keyed): Cold finished bars; 2000 lb or over. Alloy bars; 1000 to 1999 lb. All others; 2000 to 9999 lb. All HR products may be combined for quantity. All galvanized sheets may be combined for quantity. CR sheets may not be combined with each other or with galvanized sheets, for quantity.

Exceptions: (1)500 to 1499 lb. (2)20,000 lb or over. (3)450 to 1499 lb. (4)500 to 9999 lb. (5)1000 lb or over. (6)400 to 1499 lb. (7)1500 to 3499 lb. (8)2000 to 5999 lb.

C-R SPRING STEEL

Cents Per Lb. F.o.b. Mill	CARBON CONTENT 0.26–0.40	0.41–0.60	0.61–0.80	0.81–1.05	1.06–1.35
Bridgeport, Conn. *S7**	5.75	7.65	8.60	10.55	12.85
Carnegie, Pa. *S9*	.....	7.65	8.60	10.55	12.85
Cleveland *A5*	5.45	7.65	8.60	10.55	12.85
Detroit *D1*	5.65	7.85	8.80	10.55	.....
Detroit *D2*	5.65	7.85	8.80	.....	.....
Harrison, N. J. *C11*	.....	.....	8.90	10.85	13.15
Indianapolis *C5*	5.60	7.80	8.60	10.55	.....
New Castle, Pa. *B4*	5.80	8.00	8.60	.....	.....
New Haven, Conn. *D1*	5.90	7.95	8.90	10.85	.....
Riverdale, Ill. *A1*	5.70	7.80	8.75	10.70	13.00
Buffalo, N. Y. *R7*	5.45	7.65	8.60	10.55	12.85
Sharon, Pa. *S1*	5.45	7.65	8.60	10.55	12.85
Trenton *R4*	.....	7.95	8.90	10.85	13.15
Wallingford *W1*	6.20	7.95	8.90	10.85	13.15
Warren, Ohio *T4*	5.45	7.65	8.60	10.55	12.85
Weirton, W. Va. *W3*	5.45	7.65	8.60	10.55	12.85
Worcester, Mass. *A5*	6.30	7.95	8.90	10.85	13.15
Youngstown *C5*	5.45	7.65	8.60	10.55	.....

* Sold on Pittsburgh base.

BOILER TUBES

$ per 100 ft. carload lots, cut 10 to 24 ft. F.o.b. Mill	Size OD-In.	Size B.W. Ga.	Seamless H.R.	Seamless C.D.	Elec. Weld H.R.	Elec. Weld C.D.
Babcock & Wilcox	2	13	27.34	32.98	26.51	31.98
	2½	12	36.82	44.41	35.70	43.07
	3	12	42.52	51.28	41.23	49.73
	3½	11	49.63	59.87	48.13	58.08
	4	10	65.91	79.50	63.92	77.10
National/Tube	2	13	.....	32.98	26.51	.....
	2½	12	36.82	44.41	35.70	.....
	3	12	42.52	51.28	41.23	.....
	3½	11	49.63	59.87	48.13	.....
	4	10	65.91	79.50	63.92	.....
Pittsburgh Steel	2	13	27.34	32.98	.....	.....
	2½	12	36.82	44.41	.....	.....
	3	12	42.52	51.28	.....	.....
	3½	11	49.63	59.87	.....	.....
	4	10	65.91	79.50	.....	.....

Miscellaneous Prices

(Effective Apr. 27, 1954)

TOOL STEEL

F.o.b. Mill

W	Cr	V	Mo	Co	Base per lb
18	4	1	—	—	$1.48
18	4	1	—	5	2.16
18	4	2	—	—	1.64
18	4	1.5	8	—	.895
1.5	4	2	6	—	1.005

High-carbon chromium ..... .70
Oil hardened manganese ..... .39
Special carbon ..... .355
Extra carbon ..... .30
Regular carbon ..... .25

Warehouse prices on and east of Mississippi are 3.5¢ per lb higher. West of Mississippi, 5.5¢ higher.

CAST IRON WATER PIPE

	Per Net Ton
6 to 24-in., del'd Chicago	$111.80 to $115.30
6 to 24-in., del'd N. Y...	115.00 to 116.00
6 to 24-in., Birmingham	98.00 to 102.50
6-in. and larger f.o.b. cars, San Francisco, Los Angeles, for all rail shipments; rail and water shipments less	$129.50 to $131.50

Class "A" and gas pipe, $5 extra; 4-in. pipe is $5 a ton above 6-in.

LAKE SUPERIOR ORES

51.50% *Fe; natural content, delivered lower Lake ports. Prices effective July 1, 1953, to end of 1954 season.*

	Gross Ton
Openhearth lump	$11.15
Old range, bessemer	10.30
Old range, nonbessemer	10.15
Mesabi, bessemer	10.05
Mesabi, nonbessemer	9.90
High phosphorus	9.90

Prices based on upper Lakes rail freight rates, Lake vessel freight rates, handling and unloading charges, and taxes thereon, in effect on June 24, 1953. Increases or decreases after such date are for buyer's account.

COKE

	Net-Ton
Furnace, beehive (f.o.b. oven) Connellsville, Pa.	$14.25 to $14.50
Foundry, beehive (f.o.b. oven) Connellsville, Pa.	$16.50 to $17.00
Foundry, oven coke	
Buffalo, del'd	$28.08
Chicago, f.o.b.	24.50
Detroit, f.o.b.	25.50
New England, del'd	26.05
Seaboard, N. J., f.o.b.	24.00
Philadelphia, f.o.b.	23.95
Swedeland, Pa., f.o.b.	23.85
Painesville, Ohio, f.o.b.	24.00
Erie, Pa., f.o.b.	25.00
Cleveland, del'd	27.43
Cincinnati, del'd	26.56
St. Paul, f.o.b.	23.75
St. Louis, f.o.b.	26.00
Birmingham, f.o.b.	22.65
Lone Star, Tex., f.o.b.	18.50

ELECTRODES

Cents per lb, f.o.b. plant, threaded, with nipples, unboxed

GRAPHITE			CARBON		
Diam. (in.)	Length (in.)	Price	Diam. (in.)	Length (in.)	Price
24	84	20.50	40	100, 110	8.95
20	72	20.00	35	110	8.95
12 to 18	72	20.50	30	110	8.95
7 to 10	60	21.00	24	72 to 84	9.10
6	60	23.25	20	90	8.95
4	40	26.00	17	72	9.10
3	40	27.25	14	72	9.50
2½	30	28.00	10, 12	60	10.30
2	24	43.50	8	60	10.55

BOLTS, NUTS, RIVETS, SCREWS

Consumer Prices

(Base, discount, f.o.b. mill, Pittsburgh, Cleveland, Birmingham or Chicago)

Nuts, Hot Pressed, Cold Punched—Sq.

	Pct Off List			
	Less Keg	K.	Less Keg	K.
	Reg.		Hvy.	
½ in. & smaller	+2	15	+2	18
9/16 in. & ⅝ in.	+7	11	+32*	+10*
¾ in. to 1½ in. inclusive	+8	10	+27**	+6**
1⅝ in. & larger	+9	9	+27	+6

* 9/16 to ¾ in.
** ⅞ to 1½ in.

Nuts, Hot Pressed—Hexagon

½ in. & smaller	11	26	8	23
9/16 in. & ⅝ in.	2	18	+20	net
¾ in. to 1½ in. inclusive	+6	12	+25	+4
1⅝ in. & larger	+8	10	+25	+4

Nuts, Cold Punched—Hexagon

½ in. & smaller	11	26	8	23
9/16 in. & ⅝ in.	9	24	+2	15
¾ in. to 1½ in. inclusive	+1	16	+9	9
1⅝ in. & larger	+16	3	+20	net

Nuts, Semi-Finished—Hexagon

½ in. & smaller	23	36	14	28
9/16 in. & ⅝ in.	18	32	4	20
¾ in. to 1½ in. inclusive	8	23	+8	10
1⅝ in. & larger	+14	5	+20	net
	Light			
7/16 in. & smaller	33	43		
½ in. thru ⅝ in.	26	37		
¾ in. to 1½ in. inclusive	18	30		

Stove Bolts

Pct Off List

Packaged, steel, plain finished 44½—10
Packaged, plain finish ..... 25½—10
Bulk, plain finish** 59*

*Discounts apply to bulk shipments in not less than 15,000 pieces of a size and kind where length is 3-in. and shorter; 5000 pieces for lengths longer than 3-in. For lesser quantities, packaged price applies.

**Zinc, Parkerized, cadmium or nickel plated finishes add 6¢ per lb net. For black oil finish, add 2¢ per lb net.

Rivets

Base per 100 lb

½ in. & larger $8.90

Pct Off List

7/16 in. and smaller 30

Cap and Set Screws

(In bulk) — *Pct Off List*

Hexagon head cap screws, coarse or fine thread, ¼ in. thru ⅝ in. x 6 in., SAE 1020, bright 40
¾ in. thru 1 in. up to & including 6 in. 26
¼ in. thru ⅝ in. x 6 in. & shorter high C double heat treat 43
¾ in. thru 1 in. up to & including 6 in. 32
Milled studs 17
Flat head cap screws, listed sizes ... 12
Fillister head cap, listed sizes 7
Set screws, sq head, cup point, 1 in. diam. and smaller x 6 in. & shorter 37

Machine and Carriage Bolts

Pct Off List

	Less Case	C.
½ in. & smaller x 6 in. & shorter	4	20
9/16 in. & ⅝ in. x 6 in. & shorter	5	21
¾ in. & larger x 6 in. & shorter	3	19
All diam. longer than 6 in...	+4	13
Lag, all diam. x 6 in. & shorter	12	27
Lag, all diam. longer than 6 in.	8	23
Plow bolts	30	..

REFRACTORIES

Fire Clay Brick

Carloads per 1000

First quality, Ill., Ky., Md., Mo., Ohio, Pa. (except Salina, Pa., add $5.00) .. $109.00
No. 1 Ohio 102.00
Sec. quality, Pa., Md., Ky., Mo., Ill. 102.00
No. 2 Ohio 93.00
Ground fire clay, net ton, bulk (except Salina, Pa., add $1.50) 16.00

Silica Brick

Mt. Union, Pa., Ensley, Ala $115.00
Childs, Hays, Pa. 120.00
Chicago District 125.00
Western Utah 131.00
California 138.00
Super Duty Hays, Pa., Athens, Tex., Windham 132.00
Curtner, Calif. 150.00
Silica cement, net ton, bulk, Eastern (except Hays, Pa.) 19.00
Silica cement, net ton, bulk, Hays, Pa. 21.00
Silica cement, net ton, bulk, Chicago District, Ensley, Ala. 20.00
Silica cement, net ton, bulk, Utah and Calif. 28.50

Chrome Brick

Per net ton

Standard chemically bonded Balt. .. $86.00
Standard chemically bonded, Curtner, Calif. 96.25
Burned, Balt. 80.00

Magnesite Brick

Standard Baltimore $109.00
Chemically bonded, Baltimore 97.50

Grain Magnesite

St. ⅜-in. grains

Domestic, f.o.b. Baltimore in bulk fines removed $64.40
Domestic, f.o.b. Chewalah, Wash., Luning, Nev.
in bulk 38.00
in sacks 43.75

Dead Burned Dolomite

Per net ton

F.o.b., bulk, producing points in:
Pa., W. Va., Ohio $14.50
Midwest 14.60
Missouri Valley 13.65

FLUORSPAR

Washed gravel, f.o.b. Rosiclaire, Ill. Price, net ton; Effective CaF_2 content

72½% $44.00
70% or more 42.50
60% or less 38.00

METAL POWDERS

Per pound, f.o.b. shipping point, in ton lots, for minus 100 mesh.

Swedish sponge iron, c.i.f. New York, ocean bags ... 11.25¢
Canadian sponge iron, del'd. in East ..... 12.0¢
Domestic sponge iron, 98+% Fe, carload lots ..... 18.0¢
Electrolytic iron, annealed, 99.5+% Fe ..... 44.0¢
Electrolytic iron, unannealed, minus 325 mesh, 99+% Fe 60.0¢
Hydrogen reduced iron minus 300 mesh, 98+% Fe.. 63.0¢ to 80.0¢
Carbonyl iron, size 5 to 10 micron, 98%, 99.8+% Fe.. 83.0¢ to $1.48
Aluminum ..... 31.5¢
Brass, 10 ton lots ..... 29.50¢ to 36.50¢
Copper, electrolytic ..... 43.50¢
Copper, reduced ..... 43.50¢
Cadmium, 100-199 lb 95¢ plus metal value
Chromium, electrolytic, 99% min., and quality, del'd... $3.60
Lead ..... 21.00¢
Manganese ..... 57.0¢
Molybdenum, 99% $2.75
Nickel, unannealed ..... 89.50¢
Nickel, annealed ..... 96.50¢
Nickel, spherical, unannealed 93.50¢
Silicon ..... 43.50¢
Solder powder.. 7.0¢ to 9.0¢ plus met. value
Stainless steel, 302 ..... 91.0¢
Stainless steel, 316 ..... $1.10
Tin ..... 14.04¢ plus metal value
Tungsten, 99% (65 mesh) .. $4.65
Zinc, 10 ton lots ..... 17.5¢ to 25.0¢

Ferroalloy Prices

(Effective Apr. 27, 1954)

Ferrochrome

Contract prices, cents per lb contained Cr, lump size, bulk, in carloads, delivered.

65-72 Cr, 2% max. Si.

0.025% C ..	34.50	0.20% C ...	33.50
0.06% C ...	34.50	0.50% C ...	33.25
0.10% C ...	34.00	1.00% C ...	33.00
0.15% C ...	33.75	2.00% C ...	32.75

65-69% Cr, 4.9% C 24.75
62-66% Cr, 4.6% C, 6-9% Si 25.60

S. M. Ferrochrome

Contract price, cents per pound, chromium contained, lump size, delivered.

High carbon type: 60.65% Cr, 4-6% Si, 4-6% Mn, 4-6% C.

Carloads 25.85
Ton lots 28.00
Less ton lots 29.50

High-Nitrogen Ferrochrome

Low-carbon type 67-72% Cr, 0.75% N. Add 5¢ per lb to regular low carbon ferrochrome price schedule. Add 3¢ for each additional 0.25% of N.

Chromium Metal

Contract prices, per lb chromium contained, packed, delivered, ton lots, 97% min. Cr, 1% max. Fe.

0.10% max. C $1.18
0.50% max. C 1.14
9 to 11% C 1.11

Low Carbon Ferrochrome Silicon

(Cr 34-41%, Si 42-49%, C 0.05% max.) Contract price, carloads, f.o.b. Niagara Falls, freight allowed, lump 4-in. x down, 24.75¢ per lb contained Cr plus 10.80¢ per lb contained Si. Bulk 2-in. x down, 25.05¢ per lb contained Cr plus 10.80¢ per lb contained Si. Bulk 1-in. x down, 25.35¢ per lb contained Cr plus 11.00¢ per lb contained Si.

Calcium-Silicon

Contract price per lb of alloy, lump, delivered.

30-33% Cr, 60-65% Si, 3.00 max. Fe.

Carloads 19.00
Ton lots 22.10
Less ton lots 23.60

Calcium-Manganese—Silicon

Contract prices, cents per lb of alloy lump, delivered.

16-20% Ca, 14-18% Mn, 53-59% Si.

Carloads 20.00
Ton lots 22.30
Less ton lots 23.30

SMZ

Contract price, cents per pound of alloy, delivered, 60-65% Si, 5-7% Mn, 5-7% Zr, 20% Fe ½ in. x 12 mesh.

Ton lots 17.50
Less ton lots 19.50

V Foundry Alloy

Cents per pound of alloy, f.o.b. Suspension Bridge, N. Y., freight allowed, max. St. Louis, V-5; 38-42% Cr, 17-19% Si, 8-11% Mn, packed.

Carload lots 16.60
Ton lots 18.10
Less ton lots 19.35

Graphidox No. 4

Cents per pound of alloy, f.o.b. Suspension Bridge, N. Y., freight allowed, max. St. Louis. Si 48 to 52%, Ti 9 to 11%, Ca 5 to 7%.

Carload packed 17.50
Ton lots to carload packed 18.50
Less ton lots 20.00

Ferromanganese

Maximum contract base price, f.o.b., lump size, base content 74 to 75 pct Mn:

Producing Point	Cents per-lb
Marietta, Ashtabula, O.; Alloy, W. Va.; Sheffield, Ala.; Portland, Ore.	10.00
Clairton, Pa.	10.00
Sheridan, Pa.	10.00

Add or subtract 0.1¢ for each 1 pct Mn above or below base content.

Briquets, delivered, 66 pct Mn:

Carloads, bulk 12.50
Ton lots, packed 14.05

Spiegeleisen

Contract prices, per gross ton, lump, f.o.b. Palmerton, Pa.

Manganese	Silicon	
16 to 19%	3% max.	$84.00
19 to 21%	3% max.	86.00
21 to 23%	3% max.	88.50
23 to 25%	3% max.	91.00

Manganese Metal

Contract basis, 2 in. x down, cents per pound of metal, delivered.

95.50% min. Mn, 0.2% max. C, 1% max. Si, 2.5% max. Fe.

Carload, packed 36.95
Ton lots 38.45

Electrolytic Manganese

F.o.b. Knoxville, Tenn., freight allowed east of Mississippi, cents per pound.

Carloads 30.00
Ton lots 32.00
250 to 1999 lb 34.00
Less than 250 lb 37.00
Premium for hydrogen-removed metal 1.50

Medium Carbon Ferromanganese

Mn 80% to 85%, C 1.25 to 1.50. Contract price, carloads, lump, bulk, delivered, per lb of contained Mn ..... 21.35¢

Low-Carb Ferromanganese

Contract price, cents per pound Mn contained, lump size, del'd Mn 85-90%.

	Carloads	Ton	Less
0.07% max. C, 0.06% P, 90% Mn	30.00	31.85	33.05
0.07% max. C	27.95	29.80	31.00
0.15% max. C	27.45	29.30	30.50
0.30% max. C	26.95	28.80	30.00
0.50% max. C	26.45	28.30	29.50
0.75% max. C, 80-85% Mn, 5.0-7.0% Si ...	23.45	25.30	26.50

Silicomanganese

Contract basis, lump size, cents per pound of metal, delivered, 65-68% Mn, 18-20% Si, 1.5% max. C for 2% max. C, deduct 0.2¢.

Carload bulk 11.00
Ton lots 12.65
Briquet contract basis carlots, bulk, delivered, per lb of briquet 12.65
Ton lots, packed 14.25

Silvery Iron (electric furnace)

Si 14.01 to 14.50 pct, f.o.b. Keokuk, Iowa, or Wenatchee, Wash., $92.00 gross ton, freight allowed to normal trade area. Si 15.01 to 15.50 pct, f.o.b. Niagara Falls, N. Y., $89.50. Add $1.00 per ton for each additional 0.50% Si up to and including 17%. Add $1.45 for each 0.50% Mn over 1%.

Silicon Metal

Contract price, cents per pound contained Si, lump size, delivered, packed.

	Ton Lots	Carloads
96% Si, 2% Fe	20.10	18.00
97% Si, 1% Fe	20.60	18.50

Silicon Briquets

Contract price, cents per pound of briquet, bulk, delivered, 40% Si, 2 lb Si briquets.

Carloads, bulk 6.30
Ton lots 7.90

Electric Ferrosilicon

Contract price, cents per lb contained Si, lump, bulk, carloads, delivered.

25% Si ...	20.00	75% Si ...	13.80
50% Si ...	10.80	85% Si ...	15.55
65% Si ...	12.20	90.95% Si ...	17.00

Calcium Metal

Eastern zone contract prices, cents per pound of metal, delivered.

	Cast	Turnings	Distilled
Ton lots	$2.05	$2.95	$3.75
Less ton lots..	2.40	3.30	4.55

Ferrovanadium

35-55% contract, basis, delivered, per pound, contained V.

Openhearth ..... $3.00-$3.10
Crucible 3.10- 3.20
High speed steel (Primos).. 3.20- 3.25

Alsifer, 20% Al, 40% Si, 40% Fe, contract basis f.o.b. Suspension Bridge, N. Y., per lb.

Carloads ..... 9.25¢
Ton lots 10.15

Calcium molybdate, 46.3-46.6% f.o.b. Langeloth, Pa., per pound contained Mo $1.15

Ferrocolumbium, 50-60%, 2 in. x D contract basis, delivered per pound contained Cb.

Ton lots $9.50
Less ton lots 9.55

Ferro-Tantalum-Columbium, 20% Ta, 40% Cb, 0.30% C. Contract basis, delivered, ton lots, 2 in. x D, per lb of contained Cb plus Ta $4.75

Ferromolybdenum, 55-75%, f.o.b. Langeloth, Pa., per pound contained Mo $1.31

Ferrophosphorus, electric, 22-26%, car lots, f.o.b. Siglo, Mt. Pleasant, Tenn., $4.00 unitage, per gross ton $106.00
10 tons to less carload $110.00

Ferrotitanium, 40% regular grade, 0.10% C max., f.o.b. Niagra Falls, N. Y., and Bridgeville, Pa., freight, allowed, ton lots, per lb contained Ti..... $1.35

Ferrotitanium, 25% low carbon, 0.10% C max., f.o.b. Niagara Falls, N. Y., and Bridgeville, Pa., freight allowed, ton lots, per lb contained Ti $1.50
Less ton lots 1.55

Ferrotitanium, 15 to 18% high carbon, f.o.b. Niagara Falls, N. Y., freight allowed, carload, per net ton $177.00

Ferrotungsten, ¼ x down, packed, per pound contained W. ton lots, f.o.b. $3.80

Molybdic oxide, briquets or cans, per lb contained Mo, f.o.b. Langeloth, Pa. $1.14
bags, f.o.b. Washington, Pa., Langeloth, Pa. $1.13

Simanal, 20% Si, 20% Mn, 20% Al, contract basis, f.o.b. Philo, Ohio, freight allowed, per pound

Carload, bulk lump ..... 14.50¢
Ton lots, bulk lump ..... 15.75¢
Less ton lots, lump ..... 16.25¢

Vanadium Pentoxide, 86-89% V_2O_5 contract basis, per pound Contained V_2O_5 ..... $1.28

Zirconium, 35-40%, contract basis, f.o.b. plant, freight allowed, per pound of alloy.

Ton lots ..... 21.00¢

Zirconium, 12-15%, contract basis, lump, delivered, per lb of alloy.

Carload, bulk ..... 8.00¢

Boron Agents

Borosil, contract prices per lb of alloy del. f.o.b. Philo, Ohio, freight allowed, B, 3-4%, Si, 40-45%, per lb contained B.... $5.25

Bortam, f.o.b. Niagara Falls

Ton lots, per pound ..... 45¢
Less ton lots, per pound ... 50¢

Corbortam, Ti 15-21%, B 1-2%, Si 2-4%, Al 1-2%, C 4-5-7.5%, f.o.b. Suspension Bridge, N. Y., freight allowed.

Ton lots per pound ..... 10.00¢

Ferroboron, 17.50% min B, 1.50% max. Si, 0.50% max. Al, 0.50% max. C, 1 in. x D, Ton lots ... $1.20
F.o.b. Wash., Pa.; 100 lb up

10 to 14% B	.85
14 to 19% B	1.20
19% min. B	1.50

Grainal, f.o.b. Bridgeville, Pa., freight allowed, 100 lb and over

No. 1	$1.00
No. 6	63¢
No. 79	50¢

Manganese-Boron, 75.00% Mn, 15-20% B, 5% max. Fe, 1.50% max. Si, 3.00% max. C, 2 in. x D, del'd.

Ton lots $1.46
Less ton lots 1.57

Nickel-Boron, 15-18% B, 1.00% max. Al, 1.50% max. Si, 0.50% max C, 3.00% max. Fe, balance Ni, delivered

Less ton lots $2.05

Silcaz, contract basis, delivered

Ton lots ..... 45.00¢